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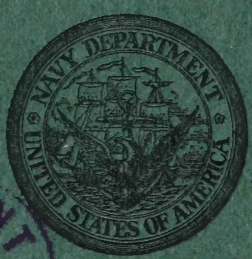
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OFFICE OF NAVAL INTELLIGENCE

MONTHLY INFORMATION BULLETIN

15 JANUARY 1919

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OFFICE OF NAVAL INTELLIGENCE,

NAVY DEPARTMENT,

WASHINGTON, D. C., *15 January 1919.*

This Bulletin is for the information of all commissioned officers.

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Officers are requested to forward for publication in this Bulletin reports on subjects of present interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

ROGER WELLES,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

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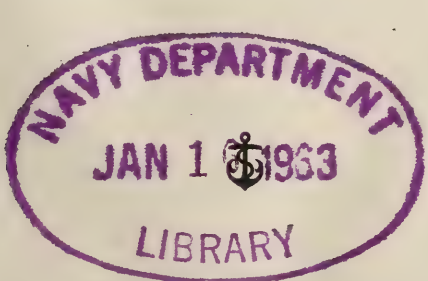
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In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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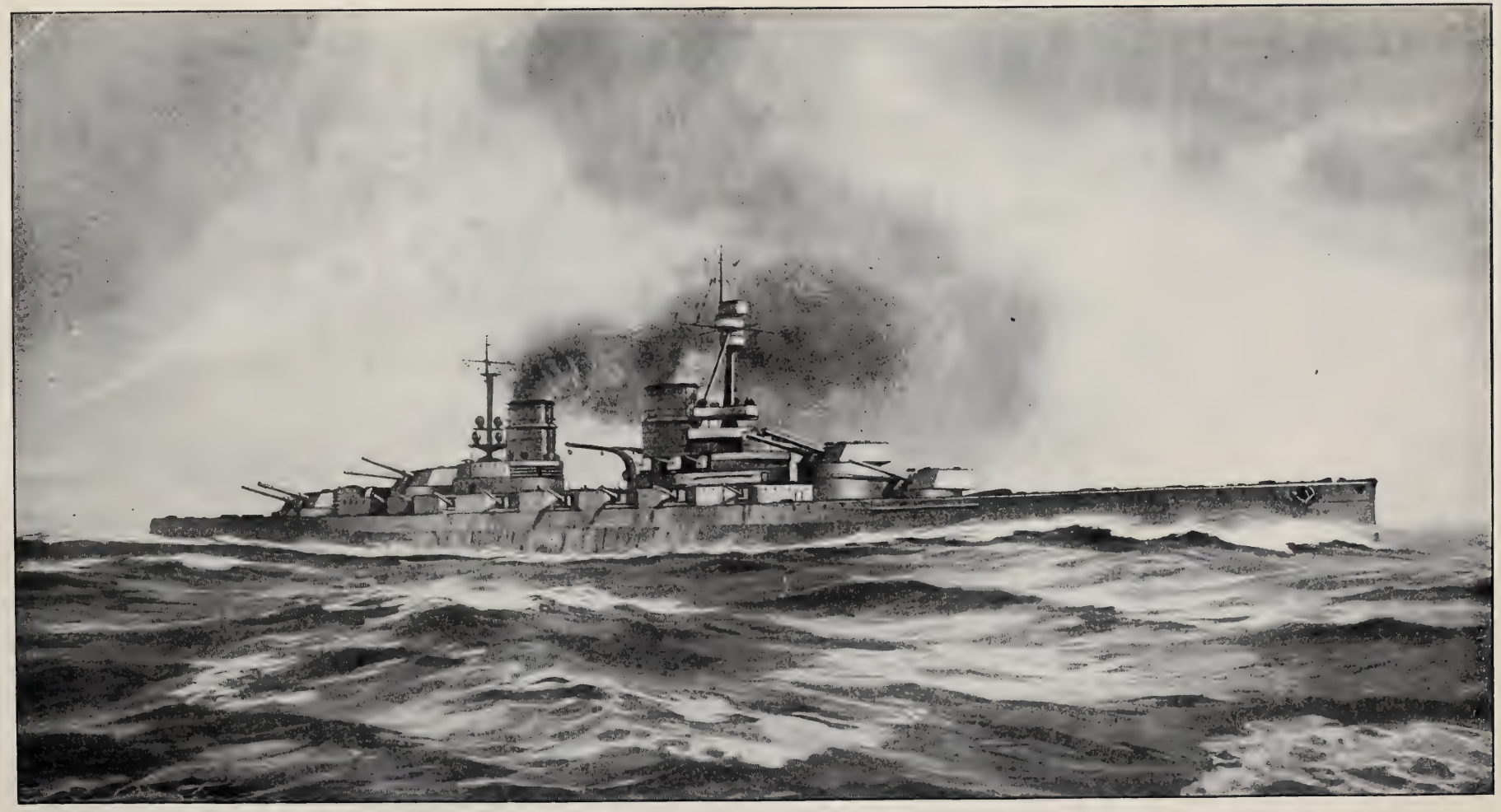
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1 HINDENBURG (MACKENSEN ON TRIALS).

ORDNANCE.

GERMAN GUNNERY INFORMATION.

Source: British.

October 1918.

(11004 U–4–a)

GENERAL GUNNERY INFORMATION.

Armament of Capital Ships, Turret Guns.

The only considerable changes in the armaments of German capital ships during the war have been the introduction of 15-in. guns into the latest battleships launched, and the complete disarmament of nearly all the old pre-dreadnought battleships and cruisers, the armaments of which have been largely utilized for land and coast defense purposes.

The heaviest gun carried by any German ship afloat at the commencement of the war was the 12-in. (30.5-cm.) L/50 gun, and the heaviest now mounted is believed to be the 15-in. (38.1-cm.) gun in ships of the *Baden* class.

The 14-in. guns which were under construction at the beginning of the war have not been mounted in ships, but have been utilized for land purposes.

The latest battleships of the *Bayern* class mount eight 15-in. guns in two-gun turrets, and it is believed that the battle cruisers building will carry six weapons of the same caliber.

All other battleships and battle cruisers carry either 12-in. or 11-in. guns in two-gun turrets.

Armament of Capital Ships, Medium Caliber Guns.

All capital ships have a secondary armament composed of 5.9-in. (15-cm.) guns. The gun's crew of a 5.9-in. gun consists of 11 men in all. The ammunition supply is by electric dredger hoist to each gun. In the latest ships these hoists are completely inclosed, and the ammunition is loaded at the bottom and withdrawn at the top of the hoist through flash-proof flap doors.

The maximum range of a 5.9-in. gun in the latest ships is believed to be 17,200 meters (18,810 yards), this being the range of the guns

of this caliber in the *Breslau*, which ship was re-armed toward the end of 1916. After the battle of Jutland ships had the upper part of their gun ports cut away so as to give greater elevation to their guns. It is thought that the above-named range is likely to be that of the guns in ships which have had their ports cut away.

Armament of Light Cruisers.

During the course of the war, all modern German light cruisers originally armed with 4.1-in. (10.5-cm.) guns have been re-armed with 5.9-in. (15-cm.) guns. This caliber of gun is also mounted in all light cruisers built during the war.

Armament of Torpedo-Boat Destroyers.

All German destroyers constructed during the war are now armed with either three or four 4.1-in. (10.5-cm.) guns mounted on the center line. The majority of these ships were originally designed to mount 22-pdr. guns.

Anti-Aircraft Guns.

The standard anti-aircraft gun in German ships is the 22-pdr. (8.8-cm.) guns. Two to four of these guns are mounted in capital ships.

It is probable that in the latest ships this gun is mounted on a special anti-aircraft mounting. Reports have, however, shown that certain ships carry the original mounting, used with this gun for anti-torpedo-boat defense, modified so as to give high angles of elevation.

Reports to the effect that submarines carry guns mounted for anti-aircraft purposes have not been confirmed. It is believed that the 4.1-in. and the 22-pdr. mountings in these vessels are capable of giving considerable angles of elevation to the gun, probably up to 45° or 50°, and that to this extent only can the guns in submarines be used against aircraft. It is believed that the same applies to all guns in torpedo-boat destroyers.

It has been stated that the latest 22-pdr. anti-aircraft gun is an automatic or semi-automatic gun, but confirmation of this statement has not been obtained, and details are entirely lacking.

Ranges of German Guns.

The following maximum ranges on the sights of modern German guns have been reported by prisoners of war or obtained from other sources. Excepting where definitely stated, these should be taken as approximate only, as it has been impossible fully to substantiate the reports in all cases.

	Meters.	Yards.
12-in. (30.5-cm.) L/50	19,800	21,655
11-in. (28-cm.) L/50	19,400	21,216
5.9-in. (15-cm.) L/45	14,000	[1] 15,310
5.9-in. (15-cm.) L/45	17,200	[2] 18,810
4.1-in. (10.5-cm.) L/45	12,700	* 13,889
4.1-in (10.5-cm.) L/40	12,200	* 13,342
22-pdr. (8.8-cm.) L/30	11,400	* 12,467
15-pdr. (8.8-cm.) L/30	7,400	* 8,093

The ranges marked * are those shown as the maximum range of each gun in captured range tables and are authentic.

NOTE.—The extreme range of the 4.1-in. gun is due to the fact that the practice of the German Navy has been to mount their secondary guns so that they may be fired at a maximum elevation. It it reported from reliable sources that the guns of the *Koenigsberg* were fired at an elevation of 45° in battle with the British monitors *Severn* and *Mersey* in the Rufigi River. These two monitors mounting 6-in. guns found themselves under fire from the 4.1-in. guns of the *Koenigsberg*. It must be considered a curiosity that within the course of two days only one of these ships was hit, and that one only once, for so good were the gunnery arrangements of the *Koenigsberg* that each monitor when under fire was straddled again and again by salvos, and when not straddled had the 4.1-in. shells falling in bunches either just short or just over them. The explanation of her having failed to get more hits than she did, while ultimately the fire of the *Severn* was completely effective, does not lie in any inferiority of skill, but almost entirely to the fact that the range, if exceptionally great for a 6-in. gun, was almost fabulous for a 4.1-in., and next that the *Koenigsberg* was a much larger target than either the *Severn* or the *Mersey*. Moreover, it must be remembered that the "danger space" of the 4.1-in. guns fired the extreme range of over 10,000 yards is very much smaller than that of a 6-in. gun.

After the Jutland action the gun ports of both heavy and medium caliber guns in certain ships were cut away so as to give increased elevation. In these circumstances it is considered likely that the ranges of the 12-in. and 11-in. guns shown above may have been increased. The range of the *Breslau's* guns shown above is believed to be that obtained after the modifications to the ports had been carried out. This is likely to be the maximum range of the guns of the secondary armaments of all the latest capital ships with modified gun ports.

Anti-Flash and Magazine Fire and Flooding Arrangements.

NOTE.—The importance of anti-flash and magazine fire and flooding arrangements becomes evident when it is remembered that the British are reported to have lost three battle cruisers—the *Indefatigable*, *Queen Mary*, and the *Invincible*—in the battle of Jutland, due to the flash of the explosion of a projectile in the turret reaching the magazine below.

It is believed that the arrangements in modern German turrets for preventing flash passing from the gun house to the magazine are

[1] Submarine. [2] "Breslau."

very thorough, and have been improved during the war as the result of the experience of ships in action.

During the action of the Dogger Bank on 24 January 1915, the *Seydlitz* was struck on the after turret by a British shell. The resultant damage was very great. The "ready ammunition," which consisted of 6 rounds per gun, was ignited, and the magazine had to be immediately flooded to prevent the loss of the ship. The entire turret's crew, including magazine and shell-room parties, lost their lives.

It is not certain whether a fire actually started in the magazine, but from this narrowly averted disaster the German authorities learned the lesson of the danger of flash, and a considerable amount of evidence has since been obtained as to the precautions taken to prevent the loss of ships due to this cause.

The following are some of the measures introduced:

1. The abolition of the ready supply of cartridges in all turrets.
2. The fitting of double flap doors at the top and bottom of hoists from the magazines and shell rooms to the working chamber, and from the working chamber to the gun house.
3. The fitting of asbestos curtains or some such device at the bottom of all the secondary armament ammunition hoists.
4. The delegation by commanding officers of the authority to order the flooding of a magazine when in action to the responsible petty officers in charge of fire and flooding parties.

The following arrangements for the prevention of fire are known to be in use, but it is not known whether any of these have been introduced during the war:

In turrets.—Fire hoses, chemical fire extinguishers, and soaked blankets.

In magazines.—Fire hoses and chemical fire extinguishers. Also means by which the magazines can be completely flooded or the cartridges in bays drenched by sprinkling apparatus, in connection with the flooding gear.

The magazine-flooding gear in all German ships appears to be very efficient. Magazines can be flooded from outside the magazine, from the deck immediately above the magazine, and from above the armoured deck.

Two methods of flooding are generally fitted, natural and artificial.

The natural flooding gear allows the water to flow direct from the sea through a master flooding valve and individual flooding valves to the magazines. The magazine inlets are so arranged as to discharge above the bays of ammunition. The flooding mains are pierced so that as soon as the water starts to enter the magazine a shower shall be delivered above each bay. Although it has hitherto

been impossible to ascertain with any degree of accuracy the time taken to flood a magazine completely, it is evident that very rapid flooding can be achieved, and there are strong indications that in this respect German ships are more advantageously fitted than the British.

The artificial flooding gear is probably worked in conjunction with the fire mains and admits of the flooding of magazines by pump from the engine room. This gear, like the natural flooding gear, can be operated from three positions. It has been stated by several prisoners that the artificial flooding gear can also be worked from the engine rooms or stokeholds.

Fire parties, whose action station is in the neighborhood of magazine-flooding valves, are trained to operate the flooding valves blindfolded, so that, in emergency in action, should the electric lighting fail, they may be able to carry out this important duty in darkness.

It has been stated that in some ships the actual flooding of magazines is carried out on occasion, the selected magazine being flooded to a depth of about 18 inches. In this connection it is interesting to note that all charges are stowed in water-tight cases in the magazines, and that the brass cartridge cases of main charges are sealed so as to be entirely water-tight. The chance of the propellant deteriorating through the action of salt water entering the cases is thus reduced to a minimum.

FIRE CONTROL.

General Remarks.

It has been impossible to obtain from prisoners such technical details of the fire control as the actual system upon which instruments work, the method of allowing for convergence in the director or of ensuring that the instruments shall not get out of step. Although every endeavor has been made to obtain information of this nature, very little success has so far been achieved.

The system of training and organization in the German Navy is largely responsible for this failure. Each man is *trained to do his particular duty mechanically*. Reliance is placed on the excellence of the instruments employed, and the operators do not therefore require a knowledge of their inner workings.

Unless, therefore, by a fortunate chance, a highly trained prisoner or deserter who is willing to talk can be obtained, the process of extracting technical information regarding fire control is likely to be somewhat slow and laborious.

System of Control.

A considerable amount of evidence has accumulated, all of which tends to show that in all modern German battleships, battle cruisers,

and light cruisers the system of fire control adopted embodies the use of a training director and the direct laying of the guns by individual gunlayers.

Gun sights are kept in adjustment by means of a system of "Follow-the-pointer" dials operated from the control tower.

It is believed that the system of change-over switches is not so thorough as in the British service, and that in the event of the two principal control positions being knocked out, control of the whole armament from one turret is not possible.

It has been stated by a reliable officer prisoner that until recently it was considered that as little reliance as possible should be placed by the gunnery officer on calculations, etc., performed in the transmitting station, and that the officer in charge of the control should endeavor to be entirely independent. The gunnery authorities have, however, now come to the conclusion that a quiet spot, away from disturbing influences, is essential for calculations and control, and, in consequence, considerably more importance is attached to the transmitting station now than formerly.

When it became known in the German Navy that plotting was carried out in the British service experiments were made, with "true course and speed" plotting. The results, however, proved unsuccessful, and plotting was abandoned.

Control Positions.

In all modern German capital ships there are believed to be two control positions: One known as the "*Vorderer Artilleriestand*," formed from the afterpart of the forward conning tower, and the other known as the "*Achter Kommandostand*," a combined navigational and control position aft.

The control positions are divided into two parts, the upper position being separated from the lower by horizontal gratings only. The lower position contains the various transmitting instruments.

The foremost position is situated before the fore bridge and the after position abaft the mainmast. Both of these positions have an armored tube leading to below the armored deck; above each position is a range finder.

Below the armored deck is a transmitting station, usually divided so as to form two compartments, one for the primary and the other for the secondary armament.

During the past two or three years there has been a marked increase in the accommodation provided aloft for control purposes, and it is believed that as a result of experience in action considerably more importance is now attached to a high position for spotting than was the case in the early days of the war. It is thought that prac-

tically all ships now have a spotting top or crow's nest in direct electrical communication with the control towers and transmitting station.

Training Directors.

The following are the principal details of the training directors so far as can be ascertained:

On either side of each control tower is a periscopic training director sight. Movements in bearing given to this sight are electrically transmitted, through the transmitting station, to training receivers in all turrets and at guns.

The training receivers are similar in general appearance to the double-dial director training receivers in use in the British service. The upper dial shows the degree bearings and the lower dial the fine adjustments of bearing. It has not been possible to find out with certainty the gearing ratio between these two dials, but owing to the known practice in the German service of the use of sixteenths of a degree for graduations of elevation and deflection scales, it appears likely that the lower dial is divided into degrees and sixteenths of a degree up to five degrees to a revolution.

The red pointers are the electrical pointers worked by the director sight and the black hands are mechanically operated by the training of the gun.

The red and green indicator at the side of the instrument is illuminated in order to show whether the bearing 0° to 180° should be read port or starboard.

Recent information has created a certain amount of doubt as to whether the training director is used as a training director proper or only as a bearing indicator. The majority of the evidence obtained tends to indicate that it is a proper director. It is, however, evident that this appliance is sometimes used as a bearing indicator in conjunction with a central officer's lookout periscope which is also fitted in the control tower. In this case the bearings of the officer's periscope are read off from a bearing ring, applied to the director periscopes, and thus transmitted to the guns.

Elevation Director.

It is not thought that an elevation director is in general use, but it is believed that experiments have been carried out in some ships with this instrument, and it is possible that it may have been installed in certain ships.

A prisoner has stated that in the *Ostfriesland* in January 1917 an instrument was attached to the sights of guns of the secondary armament which appears to have been something of the nature of a director. After the fitting of this instrument it was common talk on the seamen's mess deck that the secondary armament gun-layers' duties

were greatly reduced. It was remarked that the gun layer might just as well go away and smoke as all his work was now done for him, and he was no longer required at the gun.

No details of the instrument fitted have been obtained except that it consisted of a bronze box about 2½ ft. long and 1 ft. in height, from which electric wires led to some central position below, thought to be the transmitting station.

In this connection it is of interest to note that a reliable officer prisoner stated during conversation that when the *Helgoland* was fitted with her training director installation the opportunity was taken to wire her for director firing proper.

In the *Ostfriesland*, when the supposed elevating director was fitted, electrical receivers showing range deflection and bearing remained in position above each gun for use in the event of the breakdown of the primary control system.

Follow-the-Pointer Sights.

Follow-the-pointer sights are fitted for use in conjunction with the training director. When this apparatus is used the sights are kept constantly adjusted to the range transmitted from the control tower.

In the control tower is an electrical transmitter which transmits the ranges through the transmitting station to range receivers at the guns, near each sight.

These range receivers are similar in appearance to the training receiver, and show ranges to 25 or 50 meter divisions. The red pointer is operated by the electrical transmitter and the black one by the range wheel on the sights.

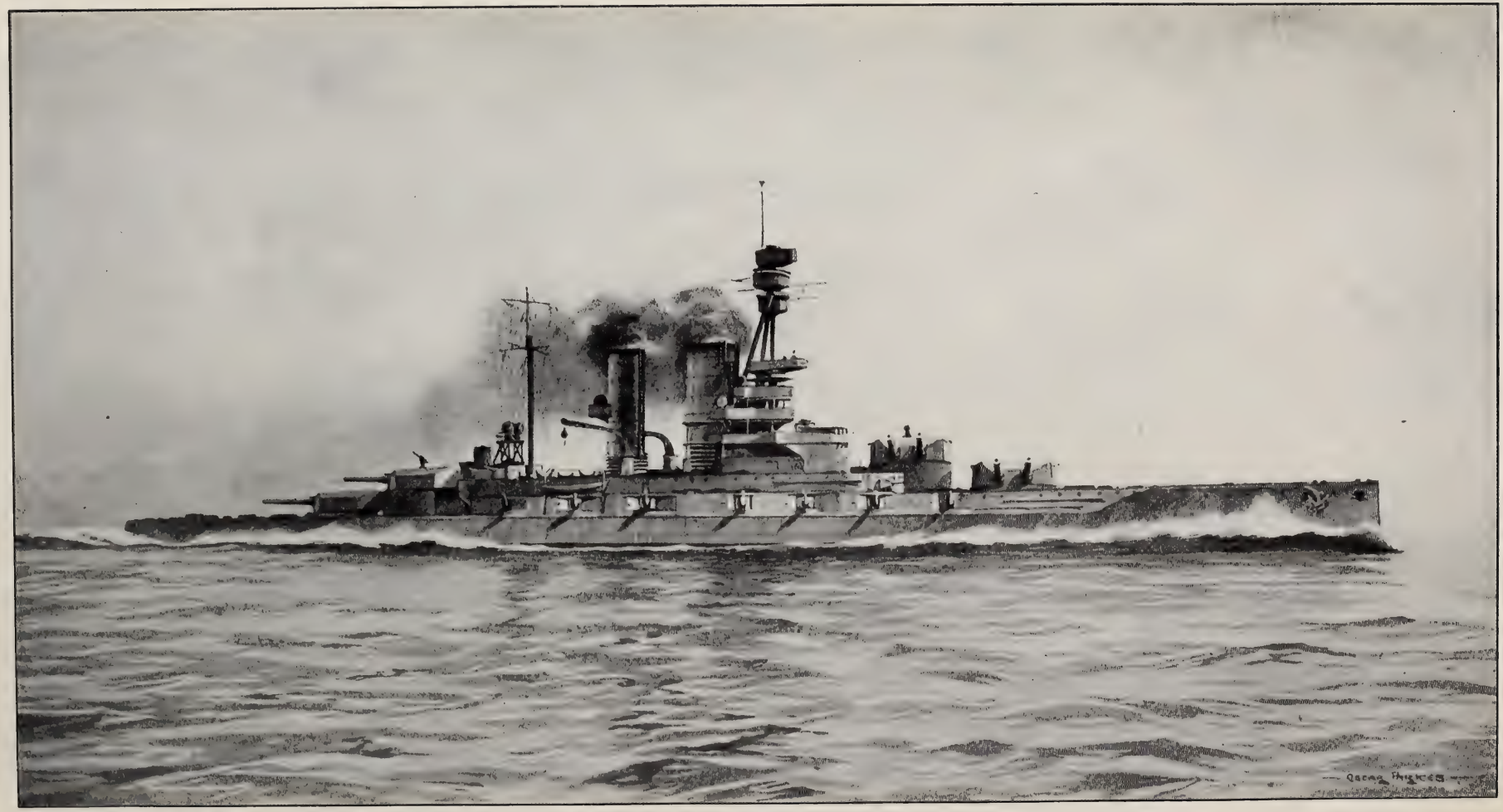
So far as it has been possible to ascertain, the receivers in turrets and at secondary armament guns are similar.

Range Meaning Device.

All ships are supplied with one or more range meaning instruments, known as the "*Mittlungs Apparat.*" This instrument enables the range-finding officer to see at a glance the mean of all the range-finder readings in the different positions where range finders are mounted, and to cut out from this mean any ranges which appear to be abnormal. The "*Mittlungs Apparat*" was introduced in German ships during 1916.

Fall-of-Shot Indicators.

The following description of the fall-of-shot indicator is derived from a captured document. This apparatus can be used to indicate the fall of three successive shots or salvos with a time of flight of not more than 45 seconds. The instrument consists of a 24-hour clock



9 BAYERN AND BADEN (SACHSEN AND WURTTEMBERG BUILDING).

with an arrangement for sounding three successive sound signals on an electrical buzzer.

It has been stated that these instruments are not looked on with favor, as officers prefer to use a stop watch in consultation with the range tables, from which they can obtain the time of flight.

Method of Using Range-Finder Readings in Control.

Information regarding the method of using range-finder readings is somewhat scarce. It has been stated by a prisoner whose statements have proved to be very reliable that in his ship, the *Ostfriesland*, it was the practice to station a very skillful observer at the range finder in the fore control tower, and to use the ranges taken by him for purposes of control, exercising a check over his ranges by an occasional mean taken from the "*Mittlung Apparat.*"

A correction is applied to the ranges taken by the range finder, and this corrected range is transmitted to the guns. The correction applied varies for the guns of the primary and secondary armament, and is obtained by the ranging officer by a reference to the range tables.

Range takers are trained to take the water line at the bow as the point for ranging upon, but there is no hard and fast rule, and in practice that point on the target is taken which is most clearly visible at the moment of taking the range.

It is of interest in connection with the statement of a prisoner from the *Breslau* to the effect that in that ship ranges were transmitted to the sights direct from the rangefinder.

Fire Control in the "Bayern."

In the *Bayern* and ships of her class the control top has been considerably developed. A range finder of $1\frac{1}{2}$ or 3 meter base is mounted in the top. This range finder has its mounting so arranged as to transmit bearings to the control tower. The informant who furnished this information explained that this arrangement was for use when, at very long ranges, the view from the control tower was not clear. Neither the ranges nor the bearings transmitted by this instrument are as accurate at moderate ranges as those obtained by the range finder above the control tower. The use of the instrument in the top is therefore limited to very long ranges.

The bearings transmitted from the top are applied to the periscopic director sight in the control tower, and so to the turrets.

So far as can be ascertained, the other control instruments in this class do not differ materially from those fitted in previous ships.

Fire Control in the Light Cruiser "Breslau."

The following report on the method of control in the *Breslau* is the only description of control in light cruisers so far obtained and

is therefore given *in extenso*. The prisoner who furnished this information was an intelligent gun layer.

The *Breslau* armament consisted of eight 5.9-in. (15-cm.) Q. F. L/45 guns, with which she had been re-armed toward the end of 1916. At the same time she received her fire-control installation. It may therefore be assumed that the installation in this ship was typical of that fitted in modern light cruisers.

The following were the primary control positions in the ship:

Forward.—A control tower above the conning tower.

Aft.—A combined conning and control tower.

Below.—A combined control and navigational station.

A training director and follow-the-pointer sights were fitted in the ship.

There were two training director sights in each control tower. Each consisted of a binocular periscope tube placed at the side of the control tower in such a position as to give a clear view between the extreme limits of training of the guns on that broadside. The training of this sight was usually performed by a body rest, but a training wheel was also fitted.

To the lower part of the periscope tube an electrical transmitting apparatus was attached, which transmitted the bearings to the receiving instruments at the guns.

As regards the follow-the-pointer sights, it was stated that ranges were transmitted direct from the range finder to the sights. This statement should be treated with reserve. The receivers at the guns were graduated in hundreds of meters to 17,200 meters, the graduations on the dials being smaller at high ranges than at low.

Two methods of firing when using the director installation were in use—"individual" firing and "combined" firing. With the former the guns were fired by individual gun layers, a fire gong being rung when the guns were to be fired. With the latter, all guns were fired electrically by means of a master firing key at the position of the director sight. When in combined firing, each gun layer has continually to keep the cross wires of his telescope on the target, as no warning of intention to fire is given by the director officer.

Of the two methods, individual firing is preferred by gun layers, and this method was used during the action with the British monitors with extremely accurate results.

Above each gun, suspended from the shield, was a deflection and range receiver, for use in case the follow-the-pointer gear should fail. These instruments showed the range in black figures on the lower part of the instrument, and above this the deflection, together with a red or green light, to show whether this should be read "left" or "right." A third figure shown on the receiver indicated the number of the ship in the enemy's line which was to be engaged.

Telaupad gear was fitted for the use of sight setters; also telephone and voice-pipe communication to the control tower and transmitting station was provided at each gun.

A range clock, a Dumaresq, range receivers from the other range finders, and a "*Mittlungs Apparat*" (range meaning device) were provided in each control position.

The spotting top was in communication with the control positions by means of telephones and voice pipes. In the top a fall of shot indicator was provided, also a Dumaresq.

RANGE FINDERS.

General Remarks.

The range finder in general use in the German Navy is the Zeiss stereoscopic instrument. No evidence has been obtained of the use for primary range-finding purposes of range finders working on any other than the stereoscopic principle, excepting in the case of torpedo craft.

There is evidence that in some and possibly all torpedo craft an instrument working on the divided image principle was in use. Recent information, however, points to these instruments having been condemned as unsatisfactory by the personnel serving in these ships, and it is believed that only stereoscopic instruments are now being issued.

In addition to these types it is believed that instruments working on the sextant principle are still supplied for auxiliary purposes or when the main range finders have been disabled in action.

Advantages and Disadvantages of the Stereoscopic Range Finders.

One of the principal advantages of the steroscopic range finder over other types is that range taking is entirely independent of well-defined vertical or horizontal lines. Prisoners have stated that no difficulty is experienced in ranging upon a cloud of smoke or on a target partially obscured by smoke. It has also been stated that night range taking is not a difficult matter.

Against these apparent advantages must be weighed the considerable drawback that range takers require a very thorough training before they become efficient, and moreover that only those men who have good stereoscopic vision are able to take ranges at all. This latter disadvantage might have very serious consequences in an action if the range takers became casualties, as their replacement would be a matter of practical impossibility.

NOTE.—The experience of the battles of the Falkland Islands and of Jutland might have some reference to the above. In both actions the enemy's fire, which had been singularly accurate and intense in the first phase of the actions, slackened as soon as the British shells began to reach their marks. The su-

perior skill, due chiefly to the wider experience and initiative of the British fire-control organizations, told rapidly, the enemy's fire control being evidently unable to survive the damages and losses of action.

Sizes of Instruments Carried.

The Zeiss (Basis-Gerat) stereoscopic range finders in use in the German Navy are of 1½, 3, 5, 6, and 8 meter base. These all work on an identical principle, although it is evident that in their fittings, both internal and external, they differ in minor respects.

All the larger range finders require two operators, one to take the ranges and the other to read off the ranges from the range scale which is on the outstide of the instrument. It is believed that some of the short-base instruments are operated by a single observer, but definite information on this point is at present lacking.

Principle of the Instrument.

The range taker must in all cases be possessed of stereoscopic vision, since the principle of the instrument lies in the artificial increase in the distance apart of the eyes and the consequent increased stereoscopic effect of the vision of the observer. The rays of light from the object, passing in at the object glasses at each end of the range finder, are deflected by prisms to the eyes of the observer. This gives that increased stereoscopic effect which would result from an actual increase in the distance between the eyes to a length equal to the length of the optical base of the range finder.

Body and Fittings on the Instrument.

The body of the instrument consists of an inner and an outer tube of metal with a lagging of asbestos between them to prevent distortion due to variations in temperature. The inner tube is made air-tight, but the air is not exhausted from it, nor is a desiccator believed to be fitted.

Instruments mounted in control towers and action signal stations are periscopic, being in the shape of a T, the arms swinging round above the observer's position, the observer being at the base of the T, behind armor.

Instruments mounted in turrets are completely behind armor with the exception of the object glasses, which are protected by light-armored hoods. These instruments have a straight body and periscopic ends. The 8-meter instruments fitted in the *Baden* pass straight across under the roof of the turret. The ends pass out through the side armor, where they are protected by light armored hoods.

The eyepieces are at the base of the T in the periscopic instruments, and in the center of the body of those with straight bases. In all cases the eyepieces have the usual graduated scales for the adjustment of the focus of each eye and of the interocular space.

Light filters of greenish and neutral tinted glass are fitted in revolving disks in each eyepiece.

Information regarding the power of magnification of instruments has not yet been obtained. It is not thought that the power can be varied.

Range Scales.

It has been reported that the range scale of the long base instruments is on a drum to the right of the eyepiece. Further information regarding range scales of these instruments has not been obtained.

It has been reported that the 6-meter instrument is graduated to a maximum range of 28,000 meters (30,621 yards), and the 5-meter instrument up to 25,000 meters (27,340 yards).

The 1½-meter base instrument is graduated similarly to the above, but to 15,000 meters only.

Field of View and Method of Taking Ranges.

All stereoscopic range finders in use in the German Navy have in the field of view a range-taking index, known as the "*Wandermarke*," usually in the form of a black triangle, apex downward, with a number of small commas forming a cross around it.

The "*Wandermarke*" can be made to appear to approach toward or to recede from the observer's eye by working a milled head on the body of the instrument. The moving of this milled head also alters the range shown on the range scale.

In order to take a range the observer turns the range-taking head until the "*Wandermarke*" appears to be vertically above the object the range of which it is desired to take. The range can then be read off the range scale by the range reader.

The "*Wandermarke*" can be illuminated at night.

When stereoscopic vision is obtained with the type of instrument described above, the cross round the "*Wandermarke*" appears to place itself in a horizontal position with the two lower arms toward the observer and the upper ones trailing away in the distance. The object of the cross is to enable the observer to judge when the "*Wandermarke*" is nearly over the target.

It is thought that there is a certain amount of difference in the fields of view of different instruments, particularly as regards the "*Wandermarke*." For example, one reliable informant has stated that there is a plain cross in the field, and another that only the black triangle existed in the range finder with which he worked.

Range-Finder Mountings.

There are two types of mounting for the long base range finder—those in control towers and action signal stations, in which the range finder can be trained, and those in turrets, in which the range finder is trained with the turret.

Mountings in control towers.—The periscope instrument mounted in control towers rests upon a ball race which encircles the upper part of the periscope tube. The instrument is trained by means of a Y-shaped bracket which fits around the observer's body. The connection between this body bracket and the range-finder body is made by two arms, which are attached to holding rings on each side of the horizontal tube.

There is a fixed graduated bearing ring in view of the observer, and a pointer on the range-finder mounting indicates on this ring the bearing of the instrument.

Elevation can be given to the instrument by means of a handle attached to the lower part of the vertical (periscope) tube below the eyepieces. A considerable angle of elevation can be obtained.

According to a reliable prisoner, vibration is not noticeable excepting at the moment when increases of the speed of the main engines are made.

Mounting in turrets.—These instruments are trained with the turret and are secured to the armored roof by means of circular clamps. They can be given elevation in a similar way to those mounted in control towers, by means of a handle at the center of the instrument.

The light armored hoods protecting the periscopic ends of the range finder are cut away so as to give a clear view in elevation.

Range takers in control towers and action signal stations stand when taking ranges. Those in turrets either stand or sit, whichever is more convenient.

Training of Range Takers.

Range takers in the German Navy undergo a very thorough course of training, before which they are subjected to a careful examination of the eyes to insure that those taking the course are possessed of entirely suitable vision.

Selection of candidates.—Candidates for the range-taking course are selected from suitable men in seagoing ships to fill vacancies in their own ships. After selection they are sent to Sonderburg for their range-finding course. At the Gunnery School they first have their eyes tested.

Eyesight test.—The eyesight test of candidates included the examination of their eyes by ophthalmoscope, the reading of Snellens type, and a stereoscopic test of their vision.

Duration of the course.—The range-taking course lasts about two months and is divided into three main parts:

(*a*) Practice in acquiring stereoscopic vision.
(*b*) Instruction in the care and adjustment of instruments.
(*c*) Practical range taking.

The first part of the course lasts about two weeks and consists in looking through a stereoscopic instructional instrument at objects at varying distances.

At the commencement of this instruction considerable difficulty is experienced by pupils in judging the relative positions of the objects seen. With practice, however, provided the eyesight is suitable, the objects stand out clearly and proficiency is soon obtained.

During the second part of the course, which lasts for only a few days, instruction is given in the care and adjustment of instruments. Range finders are not stripped down, and only that amount of instruction is given which is considered necessary to enable range takers to take ranges and to keep their instruments in adjustment. The inner working of the instruments is considered secret, and instruction in this is given only to officers.

The whole of the remainder of the course is spent in taking ranges, first with the 1½-meter and then with the 3-meter base instrument. During the earlier part of this period short and medium ranges are taken, and toward the end the maximum ranges which the instruments are capable of measuring are observed.

Degree of accuracy in range taking required by candidates.—All candidates are obliged to attain a considerable degree of accuracy before they are considered fit to qualify as range-takers. The maximum errors allowed in range readings at the end of the course are 400 meters at 20,000 meters and 200 meters at 10,000 meters, i. e., 2 per cent.

Divided Image Range Finders.

It has been definitely established that a range finder working on the divided image principle was introduced for use in torpedo craft. Recent information points to the further supply of these instruments being discontinued owing to their having proved unsatisfactory and unpopular with the personnel afloat.

There have been no indications of the use of these instruments in any but small ships, although many prisoners have been questioned concerning this point.

The instrument in use, known as the "*Invert Gerat*," or by the abbreviation I. G., is similar in principle to the range finders in the British service, but has one image inverted. There is only one eyepiece into the field of which the range scale, graduated up to 10,000 meters (10,936 yards), is introduced.

It has been stated by prisoners who have used this instrument that great difficulty is experienced in obtaining ranges in bad weather.

The "*Invert Gerat*" in use in torpedo-boat destroyers in 1917 had a base of about 1 meter and was mounted on a pedestal stand.

Positions and Numbers of Range Finders in Ships.

Generally speaking all battleships and battle cruisers have one range finder in each turret, one in each control tower, and one in each action signal station for use with the secondary armament. It has been reported that these latter instruments were removed from the *Von Der Tann*, as they were found to be useless when proceeding at full speed, owing to spray. It is thought that the range finders in these positions are still in place in battleships. In most ships a short 3-meter base instrument has recently been mounted in the control top. In addition a certain number of 3-meter base instruments are carried as spares. These latter are stowed below, and when in use are mounted on a tripod stand. One of the spare instruments is generally used as an anti-aircraft range finder. When used for this purpose it is usually mounted on the top of the after superimposed turret.

The range finders carried vary in length in the different classes of ship, and it has been impossible to establish with certainty the length of the instruments carried in all ships.

It is believed that those in the turrets and action signal stations of the ships of the *Kaiser* and earlier classes are 3 meters in length, and that in the fore control tower is of 6 meters.

Those in the turrets and action signal stations of ships of the *König* class are reported to be of 6-meter base, and those in the fore control tower probably 8 meters.

The latest battleships of the *Baden* class are believed to have 8-meter base instruments in their turrets and control towers.

Light cruisers are thought to carry three range finders, one in each control tower and one elsewhere. The largest range finder carried by these ships is believed to be of 6-meter base.

Destroyers carry one, and possibly in some cases two, instruments of 1, 1½, or 3 meter base. One of these is always mounted over the fore bridge, and where two are mounted the second is said to be aft on the top of the wheelhouse.

Submarines sometimes carry a 1½-meter base instrument, which can be mounted on the conning tower and which is stowed below when not in use.

TRAINING OF PERSONNEL.

Training of Gunnery Ratings.

There is no doubt whatever that gunnery ratings in the German Navy received a very thorough training, and that after their training courses they were exercised on board until individuals attained a very high degree of efficiency in the particular duties allotted to them.

This fact is brought out forcibly when considering the matter of salvo firing.

Frequent reports were received during the course of the war, from officers who had been in action, to the effect that the guns of German ships with which they were engaged undoubtedly were laid by director, and the inference was that they were fired by a master firing key.

The interrogation of a large number of prisoners has disclosed the fact that a master firing key was not generally used by the Germans, but that practically instantaneous salvos were obtained by the thorough training of the personnel concerned.

Thus, a gun layer from the *Breslau*, when questioned concerning the training which he had received in salvo firing, remarked that if a gun layer was unable to fire his gun within one second of the sounding of the fire gong he was punished by being given five days' cells and extra practices, and that if on three or four occasions a gun layer failed he lost his gunnery rating.

Similar evidence has been given on several occasions by prisoners, and it is thought that the harsh disciplinary measures used under the Prussian system in practice led to a very high degree of efficiency of the personnel when each individual was performing the particular office allotted to him.

Firing Practices.

Subcaliber firing.—Subcaliber firing from all guns was frequently carried out.

The subcaliber gun used in the 11-in. turrets was 8.8 cm. (3.46 in.) in caliber. The gun was inserted in the bore and the breech-block of the parent gun used with it.

In order to allow the entry of the gun into the turret, two ports were cut into the rear armor. These ports were closed by hinged flaps.

Subcaliber firing was carried out in turrets both independently and controlled. During 1917 controlled subcaliber firing was carried out at 4,400 meters' range in the *Seydlitz*.

Reports have been received that subcaliber practice was carried out at a fixed target about once every three months.

Service firings.—Long-range firing, battle practice, and night firing have been carried out about three times annually during the war, generally in the Baltic.

Since the Jutland action, the range at which battle practice had been carried out has been increased to about 20,000 meters. This firing was at a towed target, and on occasion was at the old battleship *Oldenburg* ('12). About five rounds were allowed for each 12-in. gun at battle practice.

Battle practice with reduced charges was occasionally carried out at a range of from 7,000 to 11,000 meters. Five to eight rounds of 12-in. and 10 to 15 rounds of 5.9-in. ammunition were allowed per gun for this practice.

The gunboats *Pfeil* and *Blitz* were tenders to the High Sea Fleet and used for towing targets, including the old battleship *Oldenburg*, for gunnery and torpedo practices.

Squadron firings had been carried out during the war, but details have not been obtained.

Method of Firing in Action.

After the Jutland action reports were received to the effect that German ships fired two or more salvos before the first salvo had pitched. No evidence of this practice has been obtained from prisoners of war, but, on the contrary, it has been stated that, except in rapid firing, when the range had been obtained, each salvo was invariably spotted before the succeeding salvo was fired.

Barrage firing.—The practice of forming a curtain of fire into which an enemy ship must steam in order to approach the firing ship was in force, and was used during the Jutland action. This system of firing was only used against vessels steaming at high speed, such as torpedo craft and light cruisers.

Night action.—It has been frequently reported by prisoners that the foremost turrets in battleships and battle cruisers were not used during night action on account of the dazzling effect of the flash of these guns on the personnel stationed on the bridge.

GERMAN GUNNERY IN THE WAR.

Source: Extract from "The Navy in Battle," by Arthur Pollen.

There has been no feature of any gunnery action more regularly reproduced in the war than the rapidity with which the Germans found the range at the beginning of an action, or the regularity with which the projectiles of every broadside fell together. It will be remembered how the *Koenigsberg* showed the most perfect accuracy of fire at nearly 11,000 yards in the action with the British monitors *Severn* and *Mersey*, up the Rufigi River. Capt. Glossop, of the *Sydney*, similarly reports that the *Emden* opened fire before the *Sydney* at a range of 10,000 yards. "Her first shots fell well together for range, but very much spread out for line. They were all within 20 yards of the ship. As soon as her first salvo had fallen she began to fire very rapidly in salvos, the rate of fire being as high as 10 rounds per gun per minute, and very accurate for the first 10 minutes." This statement reproduces almost verbatim Commodore

Tyrwhitt's comment on the fire of the German cruisers in his third action of the Heligoland affair. He drew attention to the fact that German cruisers can send salvo for salvo, all within a few yards of the target, without securing a hit. It proved to be a feature common to all engagements. The same phenomenon is found at the destruction of the *Koenigsberg*, whose guns both throughout the first and second day of that affair seem to have had the exact range, although only one hit was registered. As in the case of the *Emden* and *Sydney*, the *Scharnhorst* and *Gneisenau* in the battle of the Falkland Islands had salvo after salvo straddling the British battle cruisers at a range of over 11,000 yards before they had been firing five minutes. The rapidity with which they found the range was such that Admiral Sturdee thought it wise to increase the range.

This testimony to the accuracy of the enemy's fire must be read in connection with Capt. Glossop's statement that in all about 10 hits were made by the *Emden*, that only one hit was made by the *Koenigsberg*, and that comparatively few hits were registered by the German cruisers off Falkland Islands and in the Heligoland Bight.

The explanation, both of the Rufigi monitors and of *Sydney's* comparative immunity, is undoubtedly the extreme range at which each action was fought. At such ranges a gun of so small a caliber as the 4.1-in. gun mounted on the German cruisers would have to be raised to a very high elevation. It appears to be a universal practice with the Germans to mount all their guns, from the largest to the smallest, so that they can be used at extreme elevation. The projectiles, therefore, would fall very steeply toward the target. In conditions like these salvos may fall just short and just over, and even straddle the ship fired at, without a single hit being made.

ORDNANCE EQUIPMENT ON BRITISH FLOTILLA LEADERS.

Source: Inspection of British Flotilla Leader.

4 November 1918.

(9877 U–1–J.)

This vessel had recently returned to Harwich from a refit period, during which the destroyer type director firing had been installed. This installation consists of a destroyer type gun director mounted on the bridge, and gun mount attachments to 4.7-in. mounts of the Vickers destroyer type for training only. This installation is similar in all respects to the drawings previously received from the Bureau of Ordnance. Inasmuch as the installation was very recent and had not been used in actual firing, the personnel were not very familiar with its use. The location of the gun director on this type of vessel,

in close proximity to the commanding officer, navigator, and gunnery officer, is excellent. Abaft the gun director is located a 9-foot Barr & Stroud range finder, which is at all times under control of the commanding officer and gunnery officer. Enlisted men are used at the gun director and range finder. The gun director is mounted on a platform about 6 inches from the deck of the bridge and appears to be rather light. The gun director is fitted with motor generator and battery-firing circuit, but inasmuch as motor generators have not been installed in the flotilla leaders, the battery-firing circuit is used for the director. In connection with the details and use of the gun director, it is noteworthy that the gunnery officer and gunner are about the only personnel on the vessel who are familiar with the director installation, and the gunner appeared to be most familiar with the details. It is intended to fit a Henderson gyro to this type of gun director, but none have yet been installed. The main use of the Henderson gyro will be to keep the trainer's telescope on the target during a roll of the vessel. Inasmuch as there is but one telescope for the director operator, used both for elevation and train, the sight is not pivoted to move in elevation. Owing to the time necessarily required to obtain the director index, or director correction as it is known in the United States Navy, the personnel did not appear to like the present design for director elevation. The spray shield fitted on top of the gun director protects the operator and director gear from weather. Such a shield is considered essential for gun-director mountings on flotilla leaders and destroyers.

For use in connection with director firing and fire control, there is a voice tube to the transmitting station and a visual located near-by, indicating the range sent to the guns from the transmitting station. There are also voice tubes to each gun for use in transmitting firing orders and director correction. A mounting is fitted on both rails for the Dumaresq. An operator of the Dumaresq obtains the rate of change of range in yards per minute and transmits it to the transmitting station.

On either side of the bridge is mounted a torpedo director with voice tubes and visuals for transmitting information to the torpedo tubes. In connection with the torpedo director a portable disk is used by the torpedo officer for keeping the inclination of the enemy set, known in our service as the target angle. In making this setting and also one of the speed of the vessel and the line of fire the reading is found which is to be set on the torpedo director for obtaining the necessary deflection to be given the torpedo tubes. This torpedo director inclination instrument is furnished by the Admiralty and is of standard design. It and the torpedo director itself appear to be rather easy to use.

It is to be noted that there are no searchlights on the bridge and that none are considered necessary. Among the other instruments there located and not previously mentioned are one magnetic compass, a voice tube to the chart house, chart desk, and voice tube to the engine room. All orders to the steersman located in the chart house are given over a voice tube, also indications of speed for the engines. No steering or operation of engin-room telegraph is actually done from the bridge. For the use of the steersman, however, a mirror about 3 ft. long and 2 ft. wide is mounted to clear the forward rail of the bridge and placed at such an angle that the ship ahead is reflected down to another mirror located in the chart house in which the steersman sees the reflected image. It is thought that this may be of assistance to the steersman in following the vessel ahead when gases from guns or spray interfere with the line of sight in the chart house. No Sperry gyro compass is fitted on flotilla leaders or destroyers. Nonbreakable triplex glass is installed as a wind shield on top of the bridge and in the windows of the chart house.

In the chart house is located the ship-control gear and additional voice-tube communications to the engine room. Abaft this is the captain's emergency cabin.

Below the chart house is located the transmitting station, which is about 8 ft. long and 4 ft. wide. In it is a Vickers clock fitted with a rate attachment, an elevation and deflection visual transmitter of the step-by-step type, and voice tubes to the guns. A paper disk is pasted on top of the clock, graduated in hundred of yards for use in applying a spotter's correction and keeping an indication of the total spot applied to it. The transmitting station is of adequate size for this type of vessel, the communication to the guns by voice tube and bridge is most excellent, and it appears to be well protected from wind, weather, and blast of guns.

The guns mounted on this vessel are 4.7-in. caliber, very well protected by spray shields, have open sights, one-eyepiece telescopes, a Vickers training receiver on the right side of the gun, and an arm on the left side fitted for plying the index correction. The spray shield extends forward and on top of the mount so as to completely protect the personnel of the gun and the gun mount from weather and blast. This protection is such that the director gear, telescopes, firing circuit, and the service of the gun are well taken care of. These guns use *powder bags* and no objection so far has been raised to their use.

On this type of vessel other points of interest are:

(*a*) Arrangement of two triple topedo tubes 21-in. on the fore and aft line, which fire torpedoes with a range of 16,000 yards at 23 knots speed.

(*b*) There are 12 officers in the wardroom, in which all commissioned officers, midship, and warrant officers mess. The engineer officers appear to be old, experienced engineers of rank of commander or lieutenant commander.

(*c*) This vessel is said to have attained a speed of 38 knots.

(*d*) Twelve depth charges are carried aft with two Thornycroft depth charge throwers. Communication to these is by voice tube and visual improvised abcard ship.

During the morning of 5 November a practice was witnessed aboard another flotilla leader of the same class. This vessel and four destroyers fired a practice outside of Harwich harbor; speed 25 knots, column formation, firing one round to starboard and one round to port at a target of 150 ft. long towed 300 fathoms from another destroyer. Three rounds per gun were fired on each run, and the firing continued on each run about three minutes. This vessel transmitted ranges from her Barr & Stroud range finder by flag hoist to the other destroyers which are not equipped with range finders. The flotilla leader type of fire control was used, as installed on the leader previously inspected. Only one salvo, the first, was fired by director. Other salvos were fired by pointer fire, using director in train only. The rate was obtained by Dumaresq on the bridge and transmitted to the transmitting station. "Ladder" spotting was used. Fire was opened at 9,000 yards on the first turn, closing into 6,000 yards. This vessel obtained a straddle on the first salvo at 9,000 yards. This pattern was about 400 yards; smooth sea and little wind. On the first run firing was attempted during a 20° change of course, but the guns could not train as rapidly as the slewing gear of the director, with the result that practically no firing was down during the turn. Each destroyer in turn fired after the leader in a similar manner. During all the firing the leader was guide in column formation, speed 25 knots. Changes, of course, were made following the leader. Data was obtained during the firing, and after rake observations were received from the towing ship an analysis was obtained. The destroyers which fired were not fitted with director firing. This practice indicated the value of director firing in train, the value of the 9-foot range finder on the flotilla leader, the difficulty of keeping deflection by the British method when at high speeds, the vibration of the gun director as at present mounted, and its effect upon the accuracy of gun fire and director firing using director elevation. A study of the analysis curve of the firing showed that the clock rate as used was considerably in error at different periods of the firing. With the exception of premature fires at the after gun, caused by one portion of the firing circuit being jammed each time the plug was closed, the battery of the

leader was fired without casualty. There was no unnecessary noise, excitement, or confusion on the bridge during the firing.

On the evening of 6 November a flotilla leader went out with four destroyers after dark and held massed star shell firing; speed 25 knots, firing to starboard running in same general direction as the tow. The towing ship carried a white light as a safety precaution, which was the only artificiality of the practice. The leader made the approach followed by four destroyers, and when approximately 2,500 yards from the towing vessel the leader and two destroyers opened fire with a star shell from 3-in. anti-aircraft guns. These star shells were fired at an elevation of 20° with fuse setting of seven and eight seconds alternately. Star shells were fired at 10-second intervals throughout the run. As soon as star shells were fired and target was illuminated, the batteries of the leader and four destroyers opened fire immediately, director firing train, pointer elevation, individual gun pointing firing. Pompoms and Lewis guns also engaged. Eight rounds were fired with each 4-in. gun. Twenty-six rounds of star shell were fired—total from the leader and the two destroyers. The range was approximately 2,200 yards and the target was very well illuminated by the star shell. Firing continued for two minutes. There was little interference due to the blast of guns or gases and the shooting in general appeared to be quite good. Spotting was done by the gunnery officer. The ladder method was not used in this firing. An attempt was made to spot on and try for 50 per cent of hits. The towing ship made an attempt to take rake observations on this practice. An analysis was to be made of this practice, which would show the error of rate, the fall of shot for the division in range and deflection, and ranges used. This night firing, using star shell, appears to be a valuable training for action conditions against the submarine or destroyer. It also emphasizes the necessity for a method of star-shell control to get the most effective results. It is necessary to get the proper elevation of these star shells, proper setting of fuse, and, most important of all, the proper bearings of the target to the anti-aircraft gun from which the star shells are fired. It is understood that the fuse setting for this practice brought the burst of the star shell about 1,500 ft. over the target. This practice was carried out very expeditiously and according to doctrine.

During the forenoon of 7 November, a subcaliber pair concentration practice was witnessed aboard a light cruiser. Three pounders were fired from this light cruiser, the flagship of Admiral Tyrwhitt, and another light cruiser. Opening range 4,000 yards, one run being made to starboard, the same general direction as towed target, and a second run to port in opposite direction to towed target. All firing was done by director in elevation and train, by a control gun

director aloft. All equipment of the fire control and director firing system was used. On one run the flagship indicated the ranges and deflections to be used to the cruiser astern and on the second run the other light cruiser indicated the same to the flagship. Ranges were transmitted by shapes and Aldis lamp. It was compusory that the following ship should use the ranges and deflections received. The practice indicated the value of subcaliber firing from 3-pdrs., the value of using the battery with full fire-control system, the volume of fire obtained by director, the ease control in train using director, the facility of transmitting information by ships and the Aldis lamp, and the reliability of the 3-pdr. mentioned used and its accuracy.

Inspections were made of a destroyer and a light cruiser while lying at anchor. This light cruiser and the other light cruisers are fitted with almost as complete fire control and director installation as battleships. It includes the Vickers full director installation of 6-in. guns, Evershed system to guns, transmitting station, top, searchlights, range finders, Dreyer auxiliary plotting table, range and deflection indicators, good voice tube communication to torpedo directors on the bridge, Henderson gyro on gun director, Dumaresq in the top and use of rate officer. The destroyer will get a destroyer type director installation in the future. There is a transmitting station in the chart house equipped with a Vickers clock, a voice tube, and visual communication to the guns.

(*a*) Considering the fire-control installations on the flotilla leader and destroyer inspected, and the simple director firing installation now being put aboard the United States destroyers, it is believed that with proper spray shields on 4-in. guns the full Vickers director firing installation should when available be placed aboard United States destroyers. It is realized, however, that at the present time this is impossible, due to the lack of production in the States. If hostilities should continue, it is believed that the simple director firing system should continue to be placed aboard our destroyers in order that they may have one type of director-firing system and become accustomed to this method of firing. The importance of having the director-firing system in train on high-speed destroyers is great. There appears to be no reason, however, as long as the chart house will stand the 1,300 pounds weight of a gun director, to omit the full Vickers installation on destroyers. As at present fitted on the destroyer leaders, the design is incomplete.

(*b*) The fire-control system of British destroyers and flotilla leaders in general is inferior to that of United States destroyers. The Mark II Ford range keeper is greatly superior to the Vickers range keeper and Dumaresq as used on the bridge. The difficulty of keeping the rate of change of range and deflection by the Dumaresq

on the bridge and its error are far greater than using the Mark II Ford range keeper.

(*c*) The use of star shells at night for destroyer work is a great feature, but searchlights should not be given up, as now appears to be the case in the British Navy. It is understood that if the enemy turns on a searchlight, star shells cease to become of value.

(*d*) Considering the time which the Harwich flotilla has been under action conditions, it appears that all vessels in that flotilla are ready for any type of service at a moment's notice. Both Admiral Tyrwhitt, the commander of the Harwich patrol, and Capt. MacLean, the commander of destroyers, are exceptionally dashing officers, in whom the whole flotilla has confidence. Both are intensely interested in the gunnery of the flotilla, the type of equipment used, and the results obtained.

In connection with the fire control and gunnery of this flotilla and the long period in which it has been in training, every practice appears to be done as a part of the day's routine. Special attention was given by Admiral Tyrwhitt that everything could be seen that was desired.

DUMARESQ'S INSTRUMENT FOR OBTAINING RATE AND DEFLECTION.

Source: British Manual of Gunnery for His Majesty's Fleet, Vol. III, 1915.

23 December 1915.

(10907B U–1–g.)

The instrument may be described briefly as a mechanical means of resolving the virtual course and speed of the enemy along and at right angles to the line of fire, and thus obtaining the required information.

Theory.

In figure 1, let OA represent the course and speed of the enemy, and XY the course and speed of own ship. Now apply a velocity

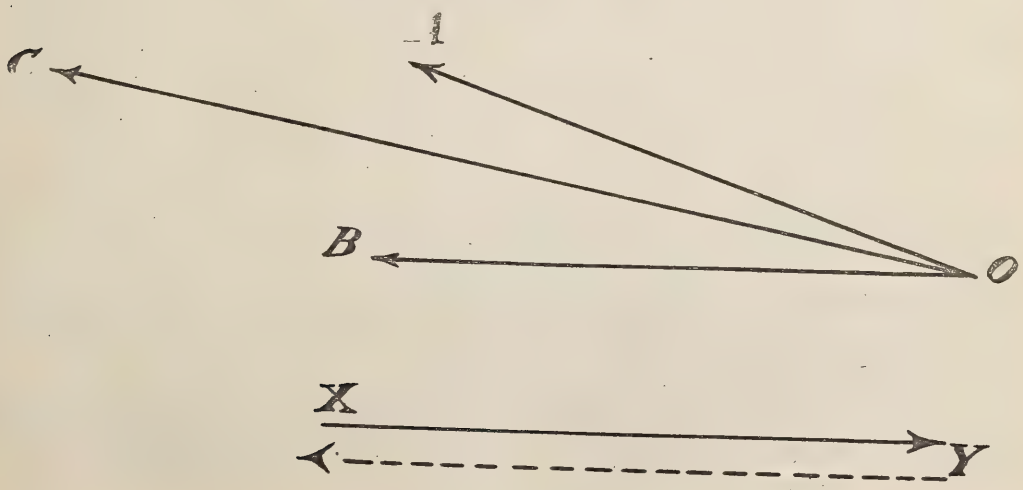


FIG. 1.

equal to XY, but in the opposite direction to both OA to XY. Let OB represent this velocity applied to OA. It will now be seen that own ship is stopped at X, and that OA and OB form two sides of a parallelogram whose diagonal is OC. Then OC will represent the virtual course and speed of enemy to own ship stopped at X. Now, if OC is resolved along, and at right angles to, the line of fire, we shall get the rate and deflection. This is done by the Dumaresq.

Figure 2 represents the skeleton of a Dumaresq instrument.

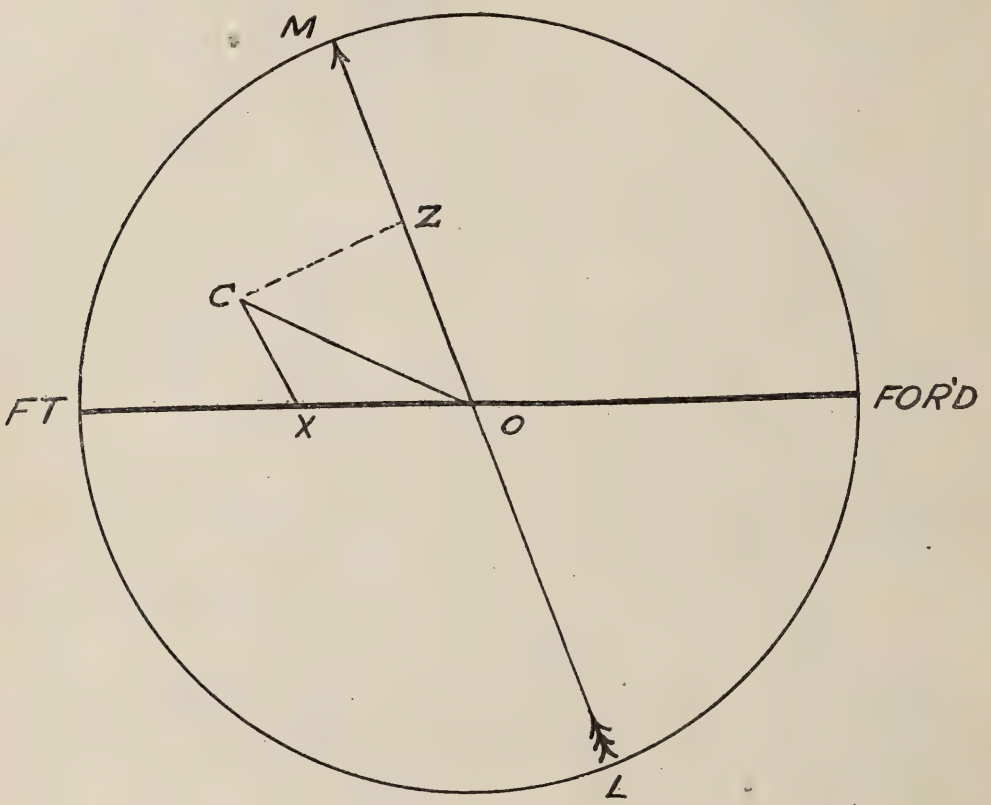


FIG. 2.

The speed of own ship is applied by moving the sliding block in an "aft" direction to, say, X. Carried on the sliding bar is the enemy's course and speed bar XC, and therefore OC is the relative course and speed of the enemy.

LM is the arrow on the dial face which is kept pointing at the enemy, and therefore represents the line of fire.

Draw CZ at right angles to LM, then OZ represents the rate and ZC the deflection for this particular setting.

The dial face is graduated with lines at right angles, and parallel to LM, and thus the rate and deflection are read off at the point C.

The rate is graduated in "yards per minute," i. e., the number of yards the rate is altering in each minute.

It will be noticed that the course and speed of the enemy are unknown factors, and can only be estimated before opening fire.

Types of Instruments.

The following instruments are now in use in the service:

Mark III. Old pattern. (Mark II is the same as Mark III.)

Mark IV. For use in turrets.

Mark V. For use in control towers and conning towers of light cruisers.

Mark VI. Latest pattern for use in control tops.

Mark VII. For use in revolving control towers.

Mark III Instrument.

Consists of a fixed brass circular ring, forming the bed of the instrument, graduated round its periphery for bearings, and revolving inside this ring is the dial face of the instrument.

Secured to the outer fixed ring is the "fore and aft" bar, on which slides a brass holder carrying the "course and speed of enemy" bar.

The lines parallel to the arrow pointer give the deflection; on one half of the dial the deflection is "Right," and on the other half "Left."

The lines at right angles to the arrow pointer show the rates, increasing from zero at the center of the dial; one half of the dial gives *opening* rates, and the other half *closing* rates.

The sloping lines give the change of bearing in degrees at the various ranges, but are only of use when "time and bearing" plotting is carried out.

To Set the Instrument.

Move the sliding block along the "fore and aft" bar until the fore end of the sliding block is at the speed of own ship.

Estimate the speed of enemy and set this on the enemy's bar, then point the enemy's bar in the direction in which the enemy is going.

Revolve the inner ring round until the sights are pointing at the enemy.

The rate is now read off under the vertical pointer attached to enemy's bar, also the deflection due to own speed and speed of enemy.

The sights must be kept on the enemy and the new rates read off as the bearing alters.

Altering Courses.

If the enemy alters the course, the enemy's bar must be turned so as to point in the direction of the new course.

If own ship alters course the sights must be kept on the enemy during the turn, and the enemy's bar must be kept pointing in the direction of the enemy's course. To assist in the latter a pointer should be fitted to the instrument, pivoted at the center of the dial.

Mark VI Instrument.

The chief difference between the Mark III and Mark VI is that the setting of enemy's course is kept on automatically during a turn of own ship.

In this instrument there is a revolving ring between the dial plate and the fixed ring, and this revolving ring is geared to the holder carrying enemy's bar. It is also geared to the dial plate.

Any movement of the revolving ring is directly transmitted to the enemy's bar, which will move the same angular amount in the same direction as the revolving ring.

The dial plate can be moved independently of the revolving ring by means of two small pinions.

At the fore end of the "fore-and-aft" bar is a vertical worm shaft operated by means of a small handwheel on top. The worm can be connected up, or disconnected, by pressing the shaft sideways. When connected up the revolving ring, dial plate, and enemy's bar can be turned together by means of the handwheel, or the dial plate can be turned independently by means of the two small pinions.

When disconnected, the dial plate, revolving ring, and the enemy's bar can be moved round together by pushing on the revolving ring.

On the dial face of the Mark VI are screwed four thin brass strips. Two of these strips are graduated in degrees of change of bearing at 10,000 yards; the other two are plain. Two celluloid strips are supplied with the instrument, and these strips can be placed so as to slide between the brass strips.

If one of these celluloid strips is placed at the degree of change of bearing at the range of the target, and the other is placed at the rate in use, the point of intersection of the black lines on the celluloid strips will be the actual point over which the pointer on enemy's bar should be, and thus the course and speed of enemy can be checked.

This method can only be used in ships fitted with gyroscopic compass for taking bearings.

At the point of the arrow mark on the dial face will be found a movable pointer, which forms the foresight of the bearing plate. The object of this movable pointer was to take bearings a little in advance, but its use is now discontinued.

Practical Working of the Mark VI Instrument.

First set speed of own ship; then estimate speed of enemy and set it on enemy's bar. The course of enemy should be given to the Dumaresq operator as so many degrees right or left of the line of fire, from 0° to 180°. A ship steaming straight away will then be "Enemy's course 0°," an enemy abeam to starboard, steering a parallel course in the same direction as own ship, would be "Enemy's course

90° to the left," and on steaming straight towards own ship would be "Enemy's course 180°."

The Dumaresq operator will set the enemy's course with the assistance of the bar pivoted at the center of the dial; this bar should be set to the necessary degree and the enemy's bar set parallel to it.

NOTE.—The reason for giving enemy's course in this manner is so that the turret Dumaresq can be set, the line of fire being the only available datum line.

The dial plate is now trained on to the enemy, the worm shaft being connected up and the dial plate trained by means of the small pinions, and the bearing is read off and passed to all guns. The bearing is given as "Red" or "Green" 0° to 180°.

The rate and deflection are then read off.

During the firing the dial plate must be kept trained on the enemy and the changes in rate read off.

If the rate is altered by spotting, the Dumaresq must be reset to agree with the rate in use, and this is done by altering the enemy's course or speed, or both. This is best done by so manipulating the enemy's course and speed that the pointer travels parallel to the deflection lines on the dial face until the required rate is reached.

Altering Course.

If own ship alters course, the bearing must be kept on by turning the small handwheel of the worm shaft, and thus the enemy's course bar will be kept set in its correct direction.

This may also be done by unclutching the worm shaft and turning the revolving ring. This method is quicker than using the handwheel.

During a turn the speed of own ship must be reduced, and experience shows that at speeds from 12 to 16 knots the loss of speed is from 5 to 8 knots for turns over 4 points.

When steadied, own speed setting is gradually increased by about 1 knot per minute until the original speed is attained.

Mark V Instrument.

This instrument is intended for use in spotting and control towers (except revolving control towers), and also in conning towers of light cruisers.

It is mounted on a bracket on the level of the observation slits, and for this reason the bearing of enemy pointer has been fitted to the reverse side of the bearing plate, and the fixed bed of the instrument graduated accordingly. By this means the bearing of enemy can be read off for transmission to the guns.

In other ways it is similar to the Mark III.

Mark VII Instrument.

This instrument is designed for use in revolving control towers.

It is similar to the Mark VI, except that it is geared to a rack in the control tower, so that as the control tower is trained on to the object the bearing is automatically set on the instrument.

Mark IV Instrument.

In a turret the direction of the ship's fore and aft line is not known when the turret is training, and the fore and aft bar can not therefore be fixed as in the case of the other instruments.

The only datum line available is the line of fire when the turret is trained on the object. The arrow on the dial face of the Mark IV instrument is therefore fixed in line with the guns, and the bearing, as passed to the turret or as read off from the indicator, is set on the instrument, thereby turning the fore and aft bar to its correct direction.

There is a graduated ring over the enemy's bar. This ring is geared to the large pinion shown on the left of the plate, so that wherever the fore and aft bar is moved the graduated ring will be kept in the same relative position to the arrow on the dial plate.

The ring is graduated from 0° to 180° on each side, one half being marked "To the right" and the other half "To the left."

When the direction of the enemy's course with reference to the line of fire is passed to the operator he can at once set the enemy's bar to the necessary degree.

The enemy's bar must be reset when own ship alters course, observing that for an alteration of course of own ship the angle between the enemy's course and the line of fire remains the same.

The operator should, after a little practice, be able to distinguish change of bearing due to alteration of course from that due to change of position of the two ships by carefully watching the rate of change of bearing shown by the bearing racer.

OPEN DIRECTOR SIGHT—BRITISH.

Source: British.

October 1917.

(10908 U–l–g.)

See Semi-Monthly Compilation, Series LXIV, 15 December 1918, page 2542.

This is a sight fitted in modern turrets for the use of turret officers.

It enables him to fire the guns himself should the turret be isolated and the gunsights out of action, or should the motion be too great and weather too thick for periscopes.

It also provides an easy and accurate means of ascertaining that the trainer is upon the right enemy ship during individual firing, and, if necessary, of correcting his aim.

The back sight is fitted in the officer's look-out hood and consists of an eyepiece and aperture, carrying the deflection in use and a correction for drift. It is independent of the fore sight. The fore sight works vertically through a hole in the roof of the turret, and is actuated by both its sight setter and the turret officer; it is not connected in any way with the guns.

Facing the sight setter are two drums, one of which is engraved in terms of range, the other in elevation.

The sight setter by setting the range on the drum lowers the fore sight a corresponding amount. The turret officer in order to bring the sight line on to the target then raises the fore sight by means of a handwheel leading from his position. The action of raising the fore sight registers on the elevation drum the amount of elevation which is being given to the sight, and which is to be put upon the guns. This elevation is called by the sight setter to the gun layers, who lay their guns by the black pointers, or if these are out of action, by the elevation arc.

A special voice pipe from the sight setter to the gun layer is required, or, if preferred, mouthpiece may be tapped into the turret officer's voice pipe to the gun layers.

The guns are fired as the sight rolls on.

NOTE.—When the range in use is set upon the sight and the turret officer has brought the fore sight into line again, he has virtually done precisely what is carried out at the gun director itself when the sight setter in setting a range depresses the intermediate arm, and the director layer in elevating the telescope transmits the necessary elevation to the guns.

The turret officer's pistols, one for each gun, are fed from the main circuit. When the turret officer wishes to fire, the lead from the gun layer's pistol is disconnected at the interceptor and that from the turret officer's pistol is connected instead.

There are two designs of open director sight, practically alike in principle but differing in certain details; the design which is fitted in all later ships may be regarded as the standard pattern.

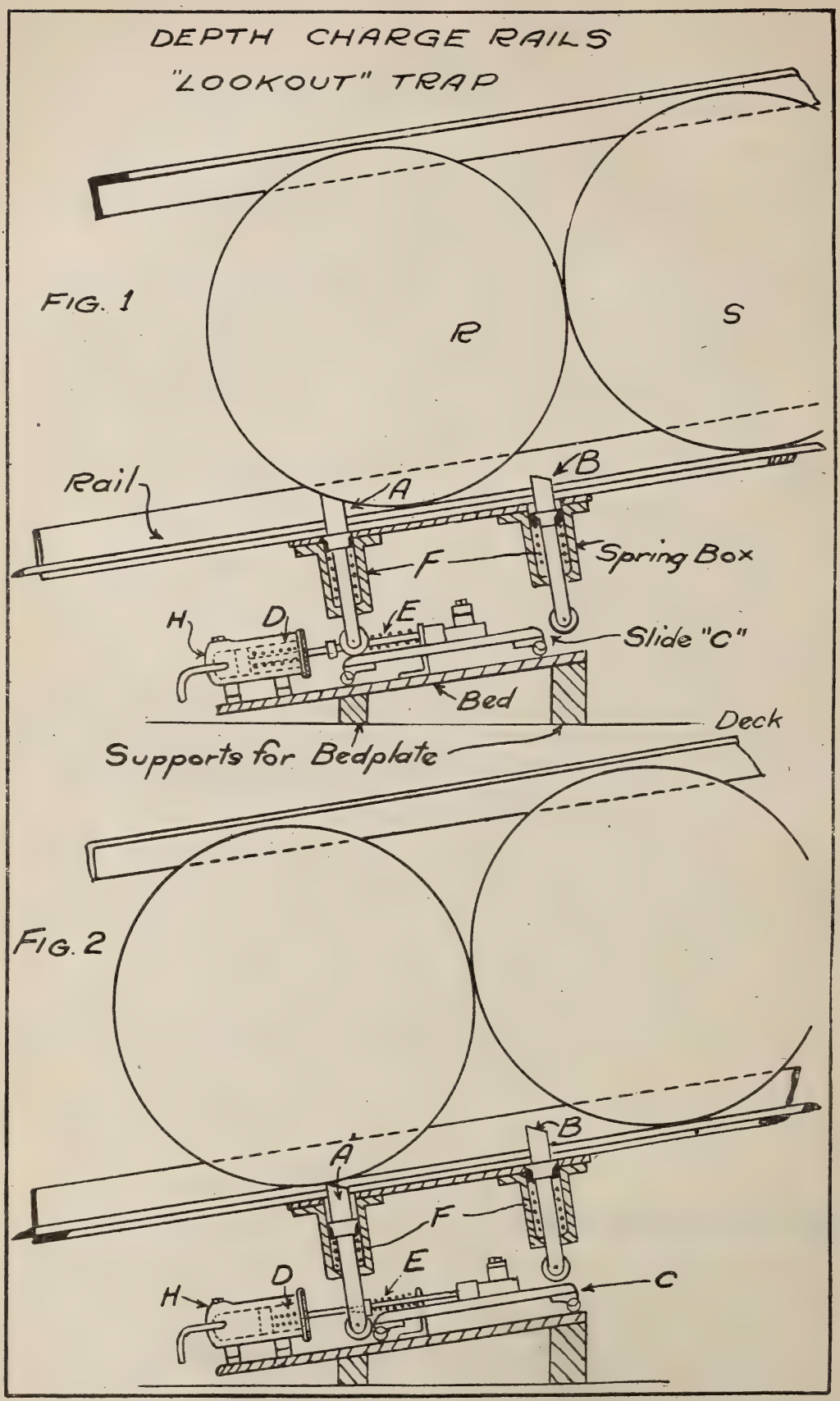
NOTE.—Some ships are fitted with drums and others with dials, depending upon the space available in the turrets and the convenience of the position.

DEPTH-CHARGE RAILS.

19 November 1918.

(10144–Q U–2–b)

Successful results have been obtained with a semi-automatic trap operated from the bridge by means of hydraulic gear. This trap was designed at Devonport and was first fitted to H. M. S. *Lookout.*


DEPTH CHARGE RAILS
"LOOKOUT" TRAP
FIG. 1
R
S
Rail
A
B
F
Spring Box
H
D
E
Slide "C"
Bed
Deck
Supports for Bedplate
FIG. 2
A
B
F
E
D
H
C

The ready charge (*R*) is prevented from rolling down the slope of the rails by two spring stops (*AA*). The lower ends of these stops are fitted with rollers and bear on a slide (*C*) which, when in the position shown in figure 1, prevents the stops *A* being pushed down by the weight of the charge. A second set of stops (*BB*) is fitted further forward, which normally are free to move down since the slide (*C*) is not beneath them (fig. 1). The standard hydraulic release gear (cylinder *H*) is fitted abaft the slide (*C*), the piston being secured to the slide.

The gear is normally in the position shown in figure 1. When the pump on the bridge is pulled up, the piston of the hydraulic gear moves to the right and the slide (*C*) is pushed away from under the stops *A*. The ready charge then bears down on the stops, moves over them, and falls overboard. The stops then return to their "up" position under the influence of springs (*F*). The same movement of the slide (*C*) brings it under the stops *BB*, thus preventing the stand-by charge from passing over these stops. The state of affairs now is shown in figure 2. When the pump on the bridge is released, the springs *D* in the hydraulic cylinder (assisted by an external spring *E*) return the piston and slide to their original positions. The stand-by charge now pushes down the stops *B* and rolls down until brought up by the stops *A*, and the trap is ready for operation again.

A lever is provided which can be shipped when required to operate the trap locally in case of a breakdown of the hydraulic gear.

The design is such that both sets of plungers can not be depressed at the same time. It is therefore impossible for two charges to be dropped accidentally instead of one.

DEPTH-CHARGE SAFETY DEVICES.

Source: War Diary, Patrol Squadrons Based on Gibraltar.

9 October 1918.

At 2 a. m., while crossing the Gulf of Lyons, the wind having increased to the force of a fresh gale, a sea broke over the *Lydonia* from the starboard quarter, passing over the stern and after end of the house deck, causing the vessel to roll 53° to port, and carrying away all three boats on the port side with their equipment and boat davits; breaking in three of the windows of the deck house; carrying away a small house aft containing the emergency radio set; breaking depth charges loose from their fastenings; breaking depth charge racks loose and carrying one depth charge and one ammunition box

containing 16 rounds of 3-in. ammunition overboard. The vessel ran before the gale to clear the convoy, and then hove to in order to clear away the débris and secure the loose articles. The wind increased to a strong gale during the day. Hove to with wind on the port bow and attempted to make the lee of Cape San Sebastian, but the seas were too heavy for the vessel to make much headway. Arrived in the lee of Cape San Sebastian at daylight on the 10th of October, and under the lee of the land attempted to overtake the convoy.

The safety devices on the depth charges appear to serve their purpose sufficiently. The depth charges were on safety, safety forks on, and a small piece of canvas lashed over the pistol. The depth charge that was washed overboard did not explode. The full force of the sea broke over the depth charges, tearing them loose from their fastenings and tearing the racks loose from the deck. Depth charges were rolling about, knocking against each other and the bulwarks. It appears that the safety devices could not have been put to a more severe practical test, which they stood very well.

RADIO-DIRECTED TORPEDOES.

17 December 1918.

(9413 R–5–b.)

Absolutely reliable information from private sources is to the following effect:

Guglielmo Marconi has perfected a torpedo controlled by radio. The movements of the torpedo can be affected only by a vertical wave; that is to say, that when controlled from an aeroplane flying over the torpedo the control can be interfered with only by another aeroplane in a position to affect the control by means of a vertical wave. The effect of this would be to render useless any horizontal wave defense on the part of a ship attacked by such torpedo. It is claimed that a ship would not be able, by the use of horizontal waves, to interfere with or deflect the course of a torpedo thus controlled.

GERMAN "M" BOATS.

1 November 1918.

(10977 R–6–c.)

German "M" boats are about 215 ft. long, 23 ft. wide, and have a draft from 4 to 7 ft. The armament is one 75-mm. gun on

forecastle, which can be used against aircraft; one 88-mm. gun near stern; and one torpedo tube on deck in front of bridge.

The mines are launched from a rear platform elevated above the deck. The mines are stored on the rear deck alongside the railing below the mine-laying platform. At the place where the rear platform meets the deck, there is on each side a tender which serves to hoist the mines from the deck on to the mine-laying platform. "M" boats can carry as many as 150 mines.

The mines are arranged in the stern and suspended by a sort of hanger above the deck. Four men raise the mine upon a small cart and take this to the lighter. The mine and cart are hoisted up upon the platform, where there is a man to receive them. He pushes the cart up to entrance of the chute on which he sees that the mine is resting. He further sees that the mine rests in a compartment which retains it in place in the chute until the time when it should be thrown out. This compartment releases the mine automatically whenever desired. Two mines are generally placed at a time, in the chute, one behind the other.

GERMAN METHOD OF LAYING MINES ON THE DOGGER BANK.

Source: German Deserter—Information Unconfirmed.

26 October 1918.

(10935 O–10–a.)

A method pursued by the mine-laying cruiser *Brummer* in laying mines on the Dogger Bank in July 1917 was said to be as follows:

A first chain of mines was laid composed of 180 mines tied into groups by means of insulated copper in such a manner that the explosion of one would explode the entire group. The space between each mine was 6 meters. These groups are called "Verbindungsperre" and the mines of which they are composed "Verbindungsminen." Another chain of 180 mines was next laid. In this chain each mine was unconnected, the space between varying from 7 to 10 meters.

NELIT—A NEW SWEDISH EXPLOSIVE.

6 November 1918.

(10981 B–4–f.)

"Nelit" is owned and patented by a company "Tillit," and the company "Sprängämnen" has bought the right to manufacture and sell it in Sweden. The demonstration was made on the site

of the new factory, which is being built 2½ kilometers from a small station on the railway between Stockholm and Upsala. At present "Nelit" is made at their laboratory in Stockholm.

It is at present made in the form of a powder enclosed in cartridges made of paraffined paper. Some of the tests were made in comparison with another Swedish explosive "Carlsonite."

Test No. 1.—A package of 10 cartons of "Nelit" was fired into with an Army rifle, four or five bullets penetrating nearly all cartridges, without the "Nelit" exploding. A package of "Carlsonite" was then fired into with the result that it exploded with the first shot.

Test No. 2.—Two cartridges were placed about 8 inches apart on a wooden box. One was exploded by means of a time fuse, while the other remained intact. To show this was not a dummy, it was also exploded by means of fuse and cap. The same test was then made with "Carlsonite," which resulted in the cartridge without the fuse exploding from detonation.

Test No. 3.—A torch was applied to the "Nelit" without it catching fire, while the "Carlsonite" burned like a calcium light; two cartridges of "Nelit" were placed among the burning "Carlsonite," but were only charred from the effects of it. They were then exploded with fuse and caps, showing that the heat had had no effect on its explosive power.

Then several demonstrations were made: blowing up a large fir tree with its roots, cutting off the trunk of another by placing the explosive in holes bored in the tree and blowing up part of a granite hill. All these experiments were made with half the quantity that would have been required if dyamite had been used.

They also showed how a charge of 80 grams cut a rail of good size and made of Bessemer steel.

The inventor of "Nelit" is Dr. Tissell and the following advantages are claimed by him:

(1) Insensible to heat (proven by test 3).
(2) Insensible to cold.
(3) Detonation only with cap and fuse.
(4) Will bear compression with perfect safety.
(5) Can be transported with perfect safety (Swedish Government will allow it to be transported without restriction.)

EXPLOSIVES—REMOVAL WHILE IN DOCK.

1 December 1918.

(10262 I U–3–C.)

The following orders have been issued by the British Admiralty:

In order to ensure to a greater extent the safety of ships while in dock, it has been decided that in future all B. L. and Q. F. car-

tridges, detonators, and primers for war heads, paravanes, and depth charges, also dry guncotton charges and detonators for same, are to be removed from British ships (including destroyers whenever possible) and ammunition ships, while in hand for docking or refit, except as provided in paragraph 4 hereof.

2. The following special precautions are to be observed in the case of British ships, and the senior officer at the port of docking and the commanding officer of the ship concerned will be held responsible for ensuring that they are rigorously carried out, viz:

(*a*) All magazines except war-head magazines are to be cleared before the ship is docked.

War heads are to be removed from the torpedoes, and no war heads are to be stowed anywhere but in the war-head magazines.

War heads are to be examined especially with regard to the possibility of anything having been inserted in the hole for the primer tube before they are placed in the magazine.

(*b*) A most careful examination of the magazines, shell rooms, and adjacent compartments, including double bottoms and ventilators, is to be made by ship's officers before restowage of the explosives after docking. All workmen to be out of the ship while this search is being made and until the ammunition is on board and stowed.

(*c*) All explosives are to be carefully examined as they come on board for restowage, but the cases and boxes are not to be opened for this purpose.

(*d*) Sentries should be placed on turret shell rooms and on shell rooms of handworked guns, and any other space where explosives are stowed, if work is to be caried out in the immediate vicinity.

(*e*) Any workmen employed in magazines or shell rooms, or submerged flats, or spaces adjacent to these compartments or in turrets, are to be accompanied by a sentry.

(*f*) Patrol and search parties are to go round the ship at irregular intervals, to examine all compartments adjacent to magazines and shell rooms.

NOTE.—Rules (*d*) and (*e*) are not to be restricted to refits, but are always to be carried out whenever workmen are on board. Rule (*f*) applies at all times.

3. It is not considered necessary to remove the explosives from a ship being docked for slight repairs to her underwater fittings, provided the crew remain on board, but all other necessary precautions are to be taken.

4. It is recognized that the foregoing arrangements will necessarily tend to lengthen the refitting period, but in order to avoid delay, whenever possible, a ship coming in for refit is to start disembarking explosives before the outgoing ship has completed embarkation.

5. Additional precautions which may be considered necessary locally to further secure the safety of ships while in dock, such as search of workmen and their tool boxes, etc., are left to the discretion of the senior officer of the port concerned, but the precautions detailed herein must in all cases be strictly observed, and should be included in the various port orders.

6. *Precautions to be taken with British ships entering or leaving dock.*—Whenever any British ship is proceeding into a dock or basin for docking or refit, all ammunition and explosives which have not already been disembarked are to be placed in the appropriate compartment on board.

This is to be done before any workmen arrive on board, and the fact is to be noted in the magazine log.

No gun on board is to remain loaded.

Whenever a British ship is leaving the dock or basin after docking or refit, no ammunition or explosives are to be prepared for sea until the ship is clear of the dock or basin, and until all workmen have left the ship, except that the senior naval officer may give directions:

(i) For the supply of ammunition to be made ready for use on board any particular ship, if special circumstances necessitate so doing before she is clear of the dock or basin; and

(ii) For depth charges to be prepared for service in any ship, provided that the primer is not inserted until after the ship has cleared the dock or basin.

7. *Search for explosives in ships arriving at dockyards in a wrecked condition.*—Ships which arrive at a dockyard in a wrecked state are to be carefully searched for explosives before any working parties are allowed on board. Working parties are to be cautioned that the finding of any explosive matter on board is to be reported immediately, and that failure to do so will be regarded as a serious offense.

The explosives for which special search should be made are as follows:

Depth charges.
Whitehead pistols.
Electric and percussion tubes.

Other explosives which should be removed are:

War heads.
Explosive paravanes.
Charges and projectiles.
Rockets and night signals.
Small-arm ammunition.

OPERATIONS.

SUBMARINE STATISTICS.

The following table shows the number of German submarines of each class sunk during each month of the war, the number entered into service during each month, and the number available for operation at the end of each month:

1914.[1]

Month.	Submarines lost.					Number entered service in month.	Number available end of month.
	U.	U. B.	U. C.	U. D.	Total.		
August	1				1	1	28
September	1				1	1	28
October						1	29
November	1				1	1	29
December	2				2	1	28
Total	5				5	5	

1915.

January	1				1	3	30
February							30
March	4				4	9	35
April						10	45
May						7	52
June	3				3	2	51
July	2		1		3	4	52
August	2	2			4	5	53
September	2				2		51
October			1		1	7	57
November			1		1	3	59
December						4	63
Total	14	2	3		19	54	

1916.

January						4	67
February						1	68
March	1	1	1		3	4	69
April		2	2		4	2	67
May	2	1			3	14	78
June						9	87
July	2	1	1		4	12	95
August			1		1	1	95
September						10	105
October		2			2	11	114
November	2	1	2		5	11	120
December		2	1		3	8	125
Total	7	10	8		25	87	

[1] Available at outbreak of war, 28.

1917.

Month.	Submarines lost.					Number entered service in month.	Number available end of month.
	U.	U. B.	U. C.	U. D.	Total.		
January	1	1			2	15	138
February	1		3		4	10	144
March	1	1	2		4	10	150
April			2		2	7	155
May	2	1	4		7	3	151
June	1	1	2		4	2	149
July	1	3	2		6	4	147
August	1	1	2		4	14	157
September	4		5		9	16	163
October	3	1	4		8	12	167
November	2	2	5		9	10	168
December	2	3	2		7	10	171
Total	19	14	33		66	113	

1918.

January	4	5			9	10	172
February	1	2	1		4	10	178
March	2	2	1		5	5	178
April	1	5			6	3	175
May	3	8	5	1	17	12	170
June	1		2		3	7	174
July		4	1		5	8	177
August		5	1		6	12	183
September	2	5			7	4	180
October	1	8	1		10		170
November				1	1		169
December							
Total	15	44	12	2	73	71	

The totals above show that during the war, up to 11 November 1918, the Germans had built 341 submarines, making a total of 369 with the 28 existing at the beginning of the war, of which they have lost 191.

The following table is a resumé of the submarine situation on 11 November 1918:

GERMAN.

Type.	Total built.	Number sunk.	Number available.	School boats.	Number operating.	Number operating in Mediterranean.	Number operating in Atlantic.
U. D	14	2	12		12		12
U	123	60	63	12	51	8	43
U. B	137	72	65	10	55	9	46
U. C	95	57	38	2	36	13	23
Total	369	[1] 191	178	24	154	30	124

[1] Including 4 submarines destroyed upon evacuation of Flanders coast, October 1918, but not including 10 submarines reported to have been destroyed by the Germans in the Adriatic.

AUSTRIAN.

	Total built.	Number obsolete.	Number sunk.	Number available.
Similar to German U. B., not smaller	34	10	8	16
Mine layer	1			1
Total	35	10	8	17

METHODS OF SINKING.

Method.	German.	Austrian.	Total.	Percentages
Rammed:				
Man-of-war	4		4	2
Merchant vessels	4		4	2
Destroyers and patrols:				
Rammed	9		9	4.5
Gunfire	9	2	11	5.5
Depth charges	37	1	38	19
Indicator nets		1	1	.5
Modified sweep	1		1	.5
Paravane	3	1	4	2
Decoy ship gunfire	14		14	7
Submarine torpedo	18	1	19	9.5
Mine nets:				
Towed	1		1	.5
Moored	9		9	4.5
Mines	24		24	12
Submarines' own mines	8		8	4
Air attack	6		6	3
Own vessels	3		3	1.5
Interned	6		6	3
Strandings	3		3	1.5
Destroyed—evacuation of Flanders Coast, October 1918	4		4	2
Unknown	28	2	30	15
Total	191	8	199	99.5

NOTE.—In several cases sinkings resulted from the employment of more than one method of attack, although in the above table only one per submarine is considered.

GERMAN SUBMARINES SURRENDERED.

9 December 1918.

(10957 C–10–H.)

The following is a list of the 123 German submarines which have surrendered to the Allied Governments (for details vide O. N. I. Publication No. 13, German Navy, submarines):

Six small boats built prior to 1914 and used for instructional purposes: *U–A*, *U–3*, *U–9*, *U–19*, *U–22*, *U–24*.

Twelve boats of 800 tons surface displacement, commissioned in 1915–16: *U–30*, *U–35*, *U–43*, *U–46*, *U–52*, *U–53*, *U–54*, *U–55*, *U–57*, *U–60*, *U–62*.

Eighteen boats of 850 tons surface displacement, commissioned in 1916–17: *U–67*, *U–70*, *U–79*, *U–86*, *U–90*, *U–91*, *U–94*, *U–96*, *U–98*, *U–100*, *U–101*, *U–105*, *U–107*, *U–108*, *U–111*, *U–112*, *U–113*, *U–114*.

Eight ocean-going mine layers of 1,450 tons surface displacement, commissioned in the spring of 1918: *U–117*, *U–119*, *U–120*, *U–122*, *U–123*, *U–124*, *U–125*, *U–126*.

Three cruiser submarines of 2,800 tons surface displacement, commissioned in the spring of 1918: *U–135*, *U–139*, *U–141*.

Four converted mercantile submarines (*Deutschland* type) of 1,700 tons surface displacement: *U–151*, *U–152*, *U–153*, *U–155*.

Five cruiser submarines, commissioned in the summer and fall of 1918, probably of about 2,800 tons surface displacement: *U–160*, *U–161*, *U–162*, *U–163*, *U–164*.

Five boats of the U. B. 1 to 47 class (small coastal submarines with single hull and saddle tanks; 250 tons surface displacement, commissioned in 1915–16, probably used for instructional purposes): *U. B. 21*, *U. B. 24*, *U. B. 25*, *U. B. 28*, *U. B. 34*.

Forty-one boats of the U. B. 48 to 150 class (these coastal submarines were standardized with a surface displacement of 502 tons): *U. B. 60*, *62*, *64*, *67*, *73*, *79*, *80*, *84*, *86*, *87*, *88*, *91*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *101*, *102*, *106*, *111*, *112*, *114*, *117*, *118*, *120*, *121*, *122*, *125*, *126*, *130*, *131*, *132*, *142*, *143*, *148*, *149*.

Twenty-one U. C. boats (mine laying, double hull, surface displacement 500 tons): *U. C. 17*, *31*, *45*, *58*, *59*, *76*, *90*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *101*, *102*, *103*, *104*, *105*.

Of enemy submarines surrendered, France has already taken 5 to French ports and expects to take 10 more. Italy expects to take 10 submarines to Italian ports, and Japan expects to take 7 submarines. Great Britain will use about 30 submarines for propaganda purposes, distributing them around different ports in the United Kingdom. The foregoing has no bearing on the final disposition of these submarines, which will be determined by the Peace Conference.

(10913 A C–10–g.)

Extracts from the arrangements for carrying out the naval terms of the armistice are here appended:

The commanding officer of each German submarine will, on the arrival of the British officer, hand over a signed declaration that he has complied with the demands laid down as follows:

(1) Batteries fully charged up.
(2) Full complement of torpedoes on board, launched back clear of torpedo tubes and without war heads.
(3) That the guns and torpedoes are on board, but that ammunition, mines, war heads, pistols, detonators, and any other explosives have been removed.
(4) That the submarine is in running condition, fully blown.
(5) That all periscopes are in place and in working and efficient condition.
(6) That all sea valves are closed and watertight doors left in efficient condition; W/T apparatus left in working order.
(7) That no infernal machines or booby traps of any sort are on board.

On arrival of the British crews, the German crews, except those actually attending machinery, are to be paraded together on the forecastle in charge of an officer, and are to leave their vessels when ordered to do so.

When the operation has been completed, the German officers and men will be taken to the transport detailed to take them back to Germany.

CRUISES AND LOSS OF U.B.–53.

3 August 1918.

(10406–O U–4–a.)

U. B. 53 left Kiel for the Mediterranean on or about 1 October 1917; having passed through the Kattegat, she crossed the North Sea and steered round Muckle Flugga. Thence she proceeded round the west coast of Ireland, well clear of land, sighting patrols and merchantmen on several occasions, but purposely refraining from attacks. Stormy weather was encountered in the Atlantic and the passage to Gibraltar is said to have occupied 27 days. The Straits of Gibraltar were safely passed on the surface at night.

U. B. 53 reached Cattaro early in November, and after spending a few days there, proceeded to Pola, where she remained for about a month in the dock yard.

U. B. 53 left Pola on 13 December 1917 for her first Mediterranean cruise, returning to Cattaro on 7 January 1918. On this and all subsequent cruises she appears to have operated in the eastern Mediterranean, proceeding direct for Alexandria via the south of Crete. The main area of operations lay athwart the trade routes converging upon Port Said and Alexandria.

One incident in this cruise is worthy of record. On Christmas Day, *U. B. 53* put in at Beirout, nominally to replenish the supply of oil fuel, but actually to give the crew a little relaxation on shore. The oil was brought down to the quay in casks by motor transport and taken on board in the usual way through the outboard connections, while the crew went ashore in two watches, each spending a few hours in the town. It was stated that this was the only occasion on which *U. B. 53* ever entered any port in the course of an undertaking.

After lying up for three weeks at Cattaro, *U. B. 53* proceeded to her usual area of operations, and is stated to have sunk 6 steamers and 1 sailing vessel, totaling 26,000 tons. This cruise lasted, roughly, from early in February to the beginning of March, 1918.

After a further intermission of about three weeks, *U. B. 53* left Cattaro again at the beginning of April, returning there about 13 May. The return from this cruise was marked by *U. B. 53* going through the Straits of Otranto submerged for the first time, all previous passages having been made on the surface.

After remaining in Cattaro for two days, *U. B. 53* left at 11 a. m. on 15 May for Pola, arriving at about 6.30 a. m. on the next day. At Pola she underwent a three months' refit, during which all the crew were granted at least four weeks' leave in Germany. On completion of this refit she left for her fourth and last cruise.

U. B. 53 left Pola on 1 August 1918, at about 8.30 p. m., Lieut. Commander Sprenger being in command. Escorted by an Austrian destroyer, she passed through the mined area at half speed, increasing later to full speed.

She dived at 4.30 p. m. on 3 August and practiced diving at depths between 98–131 during the rest of the day, rising at intervals of three-fourths hours to periscope draught. An average speed of 3¼ knots (170 revs. per minute) was maintained throughout the day, and the boat had run a distance submerged of approximately 45 miles up to about 8.30, when she ran into the net of the Otranto fixed barrage. Most of the crew were asleep at the time. The survivors stated that they had had orders to sleep when diving in order to economize the air. The helmsman at once called the captain, who ordered half speed. It was generally believed in *U. B. 53* that nets were in the vicinity, but the presence of mines in addition was not suspected. Almost immediately afterwards two explosions occurred in rapid succession on the starboard side aft.

Water immediately began to flood the stern torpedo compartment; a number of lights were extinguished and the boat lost her trim rapidly, taking up an inclination of about 30° down by the stern. The men in the stern torpedo compartment quickly evacuated it and closed behind them the water-tight door leading to the engine room. A report was immediately sent to the control room that water was coming in aft, and the commanding officer gave orders to blow all tanks and bring the boat to the surface. At the same time the Diesel engines were gotten ready, and in a few minutes *U. B. 53* was proceeding on the surface in fairly good trim. Meanwhile, after giving orders to put the main ballast pump (60 tons an hour capacity) on the flooded compartment, the engineer officer hastened aft to ascertain the damage and opened the water-tight door leading to the stern compartment, in which the water was rising rapidly. Taking with him three men provided with wooden wedges and hammers, the engineer officer proceeded to ascertain the damage, and if possible to stop some of the leaks. It was noticed that an overhead seam had opened for a considerable length, but far more extensive damage had been done to the bottom of the pressure hull, which it was impossible to localize on account of the depth of water in the compartment.

After a 10 minutes' investigation, the engineer officer decided that *U. B. 53* was not in a condition to dive again, and informed the commanding officer accordingly. The latter thereupon gave orders to abandon and sink the boat, in view of the fact that a destroyer and two trawlers had been sighted some distance off to the eastward, rendering escape on the surface impossible. Four explosive charges

were accordingly placed in the engine room, the secret documents were thrown overboard in weighted boxes, and the vents were then opened. *U. B. 53* sank about half an hour after being mined, and the crew took to the water, expecting to be soon rescued by the two trawlers, which were then approaching the spot. But for some reason the trawlers apparently turned and made off when the boat sank.

After being in the water 3½ hours, the engine-room warrant officer made out in the darkness a destroyer (H. M. S. *Martin*), which was stopped a short distance off, and swam alongside. Being an old mercantile marine engineer with a fair knowledge of the English language, he was able to shout out that 35 men from a German submarine were swimming about in the vicinity. The *Martin* accordingly switched on her searchlight, and 27 of the crew of *U. B. 53* were picked up as they swam into the rays. The remainder were drowned. Both officers and men expressed gratitude for the good treatment which they received on board H. M. S. *Martin*.

SUCCESSFUL ATTACK ON "U.B. 108" BY BRITISH DESTROYER AND SEAPLANE.

Source: Monthly Bulletin No. 2, United States Naval Forces Operating in European Waters.

October 1918.

(10816 A, U–4–a.)

The account of the following action is of particular interest because of the close and effective cooperation between the destroyer and the seaplane.

At 15.25, 28 August 1918, a British seaplane which was patrolling in the vicinity of a south-bound convoy sighted a long oil track about 5 miles away in a position 54° 31′ N., 0° 30′ W. close inshore. The seaplane altered its course to investigate and sighted a submerged submarine stationary in the water. A 520-pound bomb was dropped, which exploded 30 feet from the starboard bow. A large quantity of oil and a long succession of bubbles some 10 feet in diameter came to the surface. A British destroyer, H. M. S. *Ouse*, seeing the seaplane action, crossed at full speed and dropped two 300-pound depth charges set for 50 feet over the presumed position of the submarine. The seaplane then dropped Very's lights to indicate the position of the submarine. The destroyer steering to the spot dropped two more depth charges also set for 50 feet. On approaching the position the second time bubbles were seen rising in a moving track, on which the destroyer dropped two more charges, also set at 50 feet. Oil continued to rise and the position was bombed with four more depth

charges, after which still larger quantities of oil and air bubbles about 10 feet in diameter came to the surface. The position was buoyed and watched by trawlers. At 16.00 an obstruction was located on the bottom. Subsequent diving observations located the wreck of the *U. B. 108.*

SINKING OF "U.B.–154."

Source: Monthly Bulletin No. 2, United States Naval Forces Operating in European Waters.

October 1918.

(10816 A U–4–a.)

On 11 May 1918 British submarine *E–35* was on patrol to the westward of the Straits of Gibraltar. While running submerged a low, long object was sighted on the port beam, 2 or 3 miles away, and the submarine altered course toward it. On account of the increase of speed and the heavy sea on the port quarter, it became necessary to submerge to 40 ft., in order to keep the depth. At 13.16 the *E–35* came up to 26 ft. and observed a large enemy submarine steering north at full speed. *E–35* again went to 40 ft. and altered course 20° to intercept the enemy. At 16.14 the British submarine came up again to periscope depth and observed the range had decreased to 1,800 yards. Course was altered to 50° in order to follow the enemy submarine in the trough of the sea, as she was then directly ahead. On this course it was much easier to hold the depth and the *E–35* ran at periscope depth until 17.20, when she again dived to 40 ft. in order to increase her speed. She gradually gained on the enemy, taking periscope observations at 17.35, 17.53, and then every five or ten minutes until 18.17, when it was seen that the enemy had turned and was on the starboard side of the *E–35*, the range being not more than 50 yds. Although it was realized that she was much too close, it was decided to take the chance of a torpedo hitting while taking up its depth. At 18.18 the starboard beam torpedo was fired just inside the enemy's stern. The helm was put hard to starboard, the noise of the torpedo running growing fainter and fainter on the hydrophone. Realizing that the torpedo had missed, the periscope was again raised at 18.20 and the enemy was now seen to bear 45° on the port bow. *E–35* then continued on her course to overtake the enemy until 18.25, when both bow torpedoes were fired, the starboard at the foreturret and the port at the afterturret. Both torpedoes hit where aimed and when the smoke and water had cleared away nothing was to be seen but a quickly spreading calm sea with some wreckage floating in it. At 18.28, *E–35* came to the surface alongside the débris to pick up survivors, of whom about three were

seen clinging to the wreckage. Before these could be picked up, however, another enemy submarine (*U. B. 135*) was seen about 2½ miles away. *E–35* again dived to attack her, but it proved impossible to pick her out on the periscope and she was not seen again, although the *E–35* patrolled submerged on various courses until 20.20. On returning to the position of the first attack nothing was seen of the survivors of the *U. B. 154*.

GERMAN SUBMARINE TRANSPORTS IN THE MEDITERRANEAN.

October 1918.

(10406–O U–4–a.)

It has been stated on reliable authority that *U. C. 20* and *U. C. 73* were especially fitted for transport work to and from the North African coast. To facilitate stowage *U. C. 20*, and probably *U. C. 73* as well, had had all her mine tubes removed and the openings in the pressure hull closed. The torpedo tubes were retained forward and the boats did not seem to have undergone any marked alteration in general appearance.

Munitions (rifles and shells) were the usual cargo on the outward journey. On the return the boats were sometimes laden with skins, but their main function was to provide transport for Turkish officers. On one occasion two small camels were landed at Pola, as mascots, from *U. C. 20*.

This transport service was irregular. The duration of each African cruise was about three weeks. The boats lay offshore on the African coast and embarked and discharged their passengers and cargo by means of lighters.

CRUISES OF GERMAN SUBMARINES TO THE AMERICAN COAST.

Source: Monthly Bulletin No. 3. **November 1918.**

(10816–B U–4–A.)

Enemy submarine activities on the American coast and in the western Atlantic, which began by the sending out of the *U. D. 151* late in April, were continued until early in October. At that time the cruiser submarines on the American coast or on passage received orders to return to their bases. The success of those cruiser submarines, after the first surprise of the *U. D. 151*, steadily diminished.

The only important results of these cruises were the sinking of the U. S. S. *San Diego* by a mine from the *U. D. 156* and the injury sustained by the U. S. S. *Minnesota* which struck a mine laid by the mine-laying U-boat *U–117* on 29 October 1918. There were in all seven cruisers—*U. D. 151*, *U. D. 156*, *U–140*, *U–117*, *U. D. 155*, *U. D. 152*, *U–139*.

It is now known that the *U. D. 156* was damaged and sunk in passing through the Kattegat mine fields about 15 November 1918 upon returning to Germany after the signing of the armistice. The 25 survivors were interned in Haugsholne, Norway.

SINKING OF H. M. S. "BRITANNIA."

18 November 1918.

At 7.14 a. m. on 9 November 1918, two days before the armistice was signed, H. M. S. *Britannia*, completed in 1906, with a displacement of 16,350 tons, a speed of 18 knots, and an armament of four 12-in., four 9.2-in., and four 6-in. guns, was struck by a torpedo on the port side abreast the after 12-in. turret; dense yellow fumes followed the explosion, lasting about 10 minutes.

At the time of the torpedoing, the *Britannia* was proceeding at a speed of 11½ knots zigzagging. The weather was hazy; a short sea with white caps was running; H. M. S. *Defender* was two points forward of the port beam and the U. S. S. *Decatur* two points forward of the starboard beam.

The U. S. S. *Decatur* in position 500 yards distant went hard right, full speed ahead, and sounded general quarters, then came up on starboard quarter at reduced speed, standing by . The *Defender* went alongside, while the *Decatur* kept clear and circled. At 7.25 H. M. S. *Rocksand* came up and stood by. At 7.35 *Defender* shoved off. The *Decatur* got alongside twice, but due to the failure of the *Britannia* to secure the bowlines the wind blew the bow out and the other lines had to be let go. The *Britannia* then fired two shots from the bridge 3 pdr. at the supposed periscope, whereupon the *Decatur* proceeded to hunt the submarine on port bow. At 8 a. m. H. M. S. *Coreopsis* joined and dropped four depth charges on port bow.

From 8.03 to 8.17 the *Decatur* dropped four depth charges to port of *Britannia* to keep the submarine down. At 8.20 U. S. S. *Parker*, *Luce*, and three subchasers joined. The two newly arrived destroyers circled around the torpedoed ship. At 9 two seaplanes arrived and circled around vicinity. At 9.45 H. M. S. *Coreopsis* went alongside and took off the remaining survivors; shoved off at 10.15. H. M. S. *Rocksand* began to tow the *Britannia* toward port, but at 10.37 the battleship listed to port and capsized, sinking at 10.47.

The *Britannia* belonged to the same class as the *King Edward VII*, which was sunk by a mine on 6 January 1918.

Other battleships sunk during the war are as follows:

Audacious ('12).—Sunk by a mine, 29 October 1914.
Bulwark ('03).—Blown up off Sheerness, 26 November 1914.
Cornwallis ('03).—Sunk by submarine off Malta, 11 January 1917.
Formidable ('02).—Sunk by submarine in channel, 1 January 1915.
Goliath ('00).—Sunk by torpedo boat off Dardanelles, 13 May 1915.
Irresistible ('01).—Sunk off Dardanelles, 18 March 1915.
King Edward VII ('06).—Sunk by mine, 6 January 1916.
Majestic ('97).—Sunk by submarine off Dardanelles, 27 May 1915.
Ocean ('00).—Sunk off Dardanelles, 18 March 1915.
Russell ('03).—Sunk by mine in Mediterranean, 27 April 1916.
Triumph ('04).—Sunk by submarine off Dardanelles, 25 May 1915.
Vanguard ('10).—Blown up by internal explosion, 9 July 1917.
Danton ('09).—Sunk by submarine in Mediterranean, 19 March 1917.
Bouvet ('99).—Sunk by mine in the Dardanelles, 12 March 1915.
Suffren ('02).—Sunk by submarine on passage from Gibraltar to L'Orient, 26 November 1916.
Gaulois ('99).—Sunk by submarine in Mediterranean, 27 December 1916.

It will be noted that all these battleships, with the exception of the *Audacious*, *Vanguard*, and *Danton*, were predreadnaughts and that of the three dreadnaughts sunk only the *Danton* was torpedoed. This French battleship was struck by two torpedoes and sunk in three minutes. The experiences of the war would seem to indicate that one torpedo or mine is usually insufficient to sink a dreadnaught battleship. *Jean Bart* ('13) was struck by a torpedo through her stem. The ship was visibly lifted upward by the explosion. The torpedo tore everything out of her up to her protective deck and for a distance of 35 feet aft, but the protective deck was not seriously damaged, only parts being bent upward and the ship had no difficulty in reaching port. The British dreadnaught *Marlborough* ('14) was struck on the starboard side about 7 p. m. in the Battle of Jutland by a torpedo, the point of impact being about 18 feet below L. W. L., i. e., about 3 feet on the foreside of the bulkhead at fore end of boiler rooms. The ship quickly took up a list of 7° or 8°, but continued in the line throughout the action and until about 2 a. m. During the greater part of this time she was steaming at about 17 knots, and returned to port without any difficulty.

The German battleship *Ostfriesland* ('11) struck a mine during the night, following the Battle of Jutland. Although the compartments on the starboard side were flooded and the ship took on a heavy list, she was yet able to proceed under her own steam to Wilhelmshaven at a speed of 9 knots. Deserters reported that four other German dreadnaughts were torpedoed, but were able to return to port. The superdreadnaughts *Kronprinz Wilhelm* and *Grosser Kur-*

fuerst were torpedoed while cruising in the North Sea and were also able to return to port. From these examples it would seem that more than one torpedo is required to sink a modern battleship.

ADMIRAL BEATTY'S ORDERS REGARDING SURRENDER OF GERMAN HIGH SEAS FLEET.

Source: Admiral Rodman's War Diary of Battleship Division Nine.

20 November 1918.

1. OBJECT.

To meet and escort to an anchorage in the Firth of Forth the ships of the German High Sea Fleet which are to be handed over for internment to the Grand Fleet.

2. FORCES EMPLOYED.

Queen Elizabeth.

Oak.

1st B. S.	*Lion.*	1st L. C. S.	*Castor.*
2d B. S.	1st B. C. S.	2d L. C. S.	*Champion.*
4th B. S.	2d B. C. S.	3d L. C. S.	3d Flotilla.
5th B. S.	1st C. S.	4th L. C. S.	11th Flotilla.
6th B. S.	*Furious.*	6th L. C. S.	12th Flotilla.
	Minotaur.	7th L. C. S.	13th Flotilla.
		Fearless.	14th Flotilla.
			15th Flotilla.
			20th Flotilla.
			21st Flotilla.

3. INTELLIGENCE.

(a) The German Force to be handed over for internment on Thursday, 21 November, consists of the following vessels of the German High Sea Fleet:

Battleships.—Friederich der Grosse, flying the flag of Rear Admiral Von Reuter, who is in command of the whole force (call sign IMA); *König Albert, Kaiser, Kronzprinz Wilhelm, Kaiserin, Bayern, Markgraf, Prinzregent Luitpold, Grosser Kurfürst.*

Battle cruisers.—Seydlitz, flying the broad pennant of Commodore Tägert (call sign NCO); *Derfflinger, Von der Tann, Hindenburg, Moltke.*

Light cruisers.—Karlsruhe, flying the broad pennant of Commodore Harder (call sign WBD); *Frankfurt, Emden, Nürnberg, Brummer, Cöln, Bremse.*

Destroyers.—Fifty of the latest destroyers from the German 1st, 2d, 3d, 6th, and 7th Flotillas.

(*b*) The force will approach rendezvous "X," position latitude 56° 11′ N., longitude 1° 20′ W., on a course 270°, speed 10 knots, the leading ship passing the rendezvous about 0800, 21 November.

(*c*) The order of the German Force will be as follows:

(i) Heavy ships in single line ahead, 3 cables apart, with the battle cruisers leading.

(ii) Light cruisers in single line ahead, 3 cables apart, the leading light cruiser 3 miles astern of the rear battleship.

(iii) Destroyers in five groups, 3 miles astern of the rear light cruiser.

(*d*) The German vessels will have their guns in the securing position, trained fore and aft.

4. MOVEMENTS.

(*a*) Squadrons are to pass Black Rock Gate and are then to proceed in two lines as follows:

Squadrons in the northern line in the order:

1st L. C. S. less *Phaeton*,
6th L. C. S. less *Cardiff*,
1st C. S.,
Lion and 1st B. C. S.,
5th B. S.,
6th B. S.,
2d B. S.,
Queen Elizabeth,
4th L. C. S.,

are to pass north of May Island, and are then to proceed along the parallel of 56° 14′ N.

Squadrons in the southern line in the order:

3d L. C. S.,
2d L. C. S.,
Furious,
Minotaur,
2d B. C. S.,
1st B. S.,
4th B. S.,
7th L. C. S.,

are to pass south of May Island, and are then to proceed along the parallel of 56° 8′ N.

Queen Elizabeth will adjust speed so as to pass May Island at 0800 Thursday, 21 November, and after passing May Island will maintain speed of 12 knots.

At 0815, 21 November, squadrons are to be in station, *Lion* with 1st B. C. S. proceeding to the rear of the northern line, the 2d B. C. S. to the rear of the southern line, the 4th and 7th L. C. S. dropping astern to give room for the 1st and 2d B. C. S.

(*b*) *Cardiff* (towing a kite balloon, weather permitting), *Phaeton*, *Castor*, *Champion*, and flotillas are to proceed in company well ahead of the 1st L. C. S. in time to arrive in position latitude 56° 11′ N., longitude 1° 20′ W. at 0800, Thursday, 21 November, *Cardiff* and *Phaeton* following the 13th Flotilla out of harbor.

After passing May Island, *Cardiff* and *Phaeton* are to form 3 miles astern of the 13th Flotilla, which is to spread at daylight 21 November as a lookout screen.

(*c*) On sighting the German Force *Cardiff* and *Phaeton* are to take station 3 cables ahead of the leading German heavy ship and light cruiser, respectively. *Castor* is to form ahead of the center line of German destroyers.

Flotilla leaders and flotillas are to form on the German flotillas in accordance with orders issued by the commodore, copies of which are to be supplied to *Cardiff* and *Phaeton*.

(*d*) In the event of the reckoning of the German Fleet being in error, *Cardiff* is to report her position, 1 mile 180° from May Island. *Cardiff* is to report her position, course, and speed by W/T as soon as formed up ahead of the German Fleet.

(*e*) On sighting the German Fleet the senior officers of 1st and 3d L. C. S. are to alter course as necessary to allow the German Fleet to pass midway between the northern and southern lines at the same time making the signal by W/T: "My course is _____." Senior officers of squadrons are then to alter this course and preserve their compass bearing from the senior officers 1st and 3d L. C. S. Resuming the original course, the procedure is to be carried out, the object being to take up position preparatory to the signal "W L" being made.

(*f*) On the signal "W L" being made by the commander-in-chief, leaders of divisions of the battle fleet and leaders of battle cruiser, cruiser, and light cruiser squadrons will turn together 180° outward, remainder following in succession.

Entering Harbor.

(*g*) The northern line, with the exception of the 1st C. S., 1st, and 6th L. C. S. is to proceed into the harbor, passing north of May Island.

The 1st C. S., 1st and 6th L. C. S. are to proceed into harbor astern of the southern line.

(*h*) *Lion* and 1st B. C. S. are to wait in Largo Bay until the 5th B. S. has passed, allowing sufficient room for the divisions of the northern line to invert the line.

(*i*) Squadrons of the southern line, with the exception of the 7th L. C. S., are to turn 180° to port, battleships by divisions, the remainder by squadrons, by signal from the admiral second in command when the leading ship of the 2d B. C. S. reaches the meridian of 2° 30′ W. They will be turned to the westward again and proceed into harbor astern of the German Flotillas by order of the admiral second in command, 1st B. S., 2d and 3d L. C. S. anchoring in the berths shown in the anchorage plan (supplied to flag officers and commodores).

(*j*) The 7th L. C. S. is to proceed into harbor direct, ahead of the German Fleet, taking station astern of 4th L. C. S. after passing Fidra Gap.

(*k*) On passing Fidra Gap each division proceeding to the Fleet Anchorage is to invert the line by signal from its divisional commander, ships passing on the starboard of the ships ahead, leading ship maintaining the speed of the fleet, the rear ship increasing to 17 knots.

(*l*) As regards the German force, from position 1 mile 180° from May Island *Cardiff* is to lead the German Fleet to pass 5 cables 360° from South Buoy (Light Fl. Red) of Fidra Gap, thence for Still Point, Inchkeith, bearing 242°.

After passing Fidra Gap, the German ships should be ordered to form up according to the anchorage plan.

Castor is to lead the German Flotillas to their anchorage.

5. SPECIAL ORDERS.

(*a*) One destroyer, detailed by the commodore, is required with *Lion* and each flagship of the 1st and 2d B. C. S., 1st C. S., 1st, 2d, 4th, 5th, and 6th B. S. These destroyers are to take stations 5 cables on the outer beam of their respective flagships when the fleet is in the cruising order shown on the diagram. Commodore is to report the names of these destroyers to the senior officers concerned. *Oak* is to work with the fleet flagship.

(*b*) *Fearless*, *Blonde*, *Blanche*, *Boadicea*, and *King Orry* are to act as repeating ships.

(*c*) *Minotaur* is to follow *Furious* throughout the operation.

(*d*) P. V's are to be towed.

Navigational lights are to be burnt whilst leaving harbor and until sunrise, 21 November.

(*e*) Balloons are not to be towed except by *Cardiff*.

(*f*) *Cardiff*, *Phaeton*, and *Castor* are each to fly a blue ensign at the masthead.

Cardiff is to direct the movements of the German main force and order them to proceed, if possible, at a speed of 12 knots.

(*g*) Aircraft from local stations are to fly over the fleet in accordance with orders issued by the commander in chief, coast of Scotland and A. C. A.

(*h*) One destroyer is to be detailed by the commodore (F), for photographic duties, and is to embark photographers in the Penns p. m. Wednesday, 20 November.

(*i*) Before meeting the German Fleet, and until the signal is made to negative it, ships' companies are to be at "CB" stations.

Turrets and guns are to be kept in the securing positions, but free. Guns are to be empty, with cages up and loaded ready for ramming home.

Directors and armored towers are to be trained on.

Correct range and deflection are to be kept set continuously on the sights.

(*j*) Ships are to fly masthead flags from 0800 until sunset, 21 November.

(k) The red and blue burgees will be distinguishing signals for the northern and southern lines, respectively. For the purposes of W/T the northern line will be considered as red fleet, the southern line as blue fleet.

(*l*) German ships will be listening out on 800 meters. Should it be necessary to signal to them, plain language is to be used; the name of the officer addressed and ship of origin is to be included in the text.

DAVID BEATTY,
Admiral, Commander in Chief.

BOMBARDMENT OF DURAZZO.

2 October 1918.

FORCE ENGAGED.

On 2 October 1918 the military works, storehouses, and ships on the Durazzo Anchorage were bombarded from the sea by combined Italian, British, and American forces.

The forces at the disposal of Rear Admiral Palladini were the third division of the Italian Battle Squadron, consisting of:

(1) The three battle cruisers, *San Giorgio*, *Pisa*, and *San Marco*, completed in 1910. They have a displacement of 20,000 tons, a speed of 23 knots, and an armament of four 10-in. and eight 7.5-in. guns.

(2) Three British light cruisers, *Lowestoft*, *Dartmouth*, and *Weymouth*, with a displacement of 5,400 tons, and eight 6-in. guns each.

(3) Eight British and two Italian destroyers of 750 tons displacement.

(4) Four coastal torpedo boats.

(5) American subchaser units "B," "G," and "H."
(6) British and Italian aircraft.
(7) Eight motor boats.
(8) Four French, two British, and two Italian submarines.
(9) Covering force under Rear Admiral Mola.

OPERATION.

The operation began on the night of 1 October, when Italian launches from Valona attacked the Durazzo Anchorage. The torpedoes discharged against the docks and ships by these Italian motor boats during the night and during the action on the following day did great damage to their objectives.

During the morning there were repeated and persistent attacks by Italian and British aircraft. During the bombardment itself these craft took an active part in preventing the port batteries from replying effectively to the fire of the attacking cruisers.

During the bombardment the four French, two British, and two Italian submarines patroled the adjacent waters.

Three divisions of scouts under the command of Rear Admiral Mola cruised about close to the meridian of Cattaro for scouting duties to oppose any enemy forces that might venture to counterattack the bombarding forces. This covering force consisted of eight Italian destroyers, supported by the light cruisers, H. M. S. *Glasgow*, *Gloucester*, and H. I. N. *Marsala*, escourted by four British destroyers. The light superdreadnaught *Dante Alighieri*, escorted by two Italian destroyers, supported Rear Admiral Mola's force in case of attack.

The Italian third division under Rear Admiral Palladini carried out a bombardment lasting approximately 40 minutes. This bombardment commenced at noon, local time, and consisted of a run on a base of about 5 miles and at a range of approximately 13,000 yards, from N. W. to S. E. at a speed of 8 knots. The ships sailed in column in the line of bearing. Each ship was escorted by a PN boat zigzagging on each beam. In addition, two PN boats were stationed two points off the bow of the division leader, *San Giorgio*. Four sweepers in echelon preceded the division. H. M. destroyers *Nymphe* and *Cameleon* zigzagged on the starboard flank of the division and H. M. destroyers *Nereide* and *Ruby* on the port flank. A unit of American subchasers maneuvered about 1,000 yards off each flank of the division. These units acted as screens against submarine attack.

After the Italian ships finished their bombardment, American subschaser units "G" and "H" left the Italian ships and stood to northward to screen the British light cruisers which were advancing to position. Half an hour after the third division opened fire, the British light cruisers under Commodore Kelly began a bombard-

ment with their 6-in. guns at a range of 11,000 yards. The three light cruisers likewise advanced in column formation, escorted by four British destroyers, *Tribune*, *Shark*, *Badger*, and *Fury*. These gradully dropped back after the light cruisers came up with the subchaser units "G" and "H."

The force of 12 American submarine chasers under Capt. Nelson, U. S. N., took part in the operation, acting as a submarine screen to the two vessels while bombarding.

Capt. Nelson reports that the operations were a strategic success. The combined attack of ships and aircraft silenced the port batteries, blowing up the ammunition works, and working great havoc to the town, docks, and defenses, thereby seriously interfering with the usefulness of Durazzo as a military base. The ships which were lying in the harbor were either sunk or badly crippled. The torpedoes which were discharged against the dock and ships by the British destroyers and by the Italian motor boats which dashed into the harbor did great damage to their objectives.

Activities of the U. S. Subchasers During Bombardment of Durazzo.

Unit "H" arrived in screening position 1,000 yards on the starboard beam of the Italian bombarding squadron before this unit opened fire. Upon completion of the fire, unit "H" stood to the northward and gained a similar screening position on the British squadron shortly after this force opened fire. Upon completion of the bombardment of Durazzo, this unit received orders to screen H. M. S. *Weymouth*. *S. C. 324* took station accordingly. *S. C. 130*, while proceeding to screening station, sighted a mine similar to the German type Mark IV. This mine was in the path of four British destroyers, one of which was H. M. S. *Shark*, *S. C. 130* left formation and fired one 3-in. shell, which sank the mine. A second mine was sighted about 500 yards distant. The chaser stood close to mine in order to warn off the approaching British destroyers, all of which altered course to clear the mine.

While unit "B" (*S. C. 215*, *S. C. 128*, and *C. S. 129*) was steaming in column in a general northeasterly direction to take station on a side patrol line, the *S. C. 129* (the rear ship) was seen to sheer off to port. *S. C. 215* also turned to port, thinking the *S. C. 129* had sighted a submarine and was attacking. At this moment the *S. C. 215* sighted a moving feather about 1½ points forward of port beam, distant some 150 yards and headed to the N. E. The *S. C. 215* opened fire with her 3-in. gun and port machine gun, changed course to port toward the submarine, and hoisted signal to form for attack. The second 3-in. shot was seen by the commanding officer and executive officer to drop 2 ft. short of the then visible periscope, shattering it. (It was believed to have been shattered, as a column of air

and water was seen to rise to a height of about 6 ft. This column resembled that given off from the Italian ship *Nautilus* when the later was fouled and her periscope broken off by the *S. C. 128* at Gallipoli.) Six 3-in. shells were fired.

About the time of the second shot the submarine was seen turning to starboard toward the British light cruisers, which at this time were about 2 miles distant headed to the southward to enter their bombing sector. *S. C. 215* and *S. C. 128* closed the submarine and laid a barrage of depth charges. *S. C. 215* dropped six depth charges from her stern and fired "Y" gun charges. *S. C. 128* dropped four depth charges from her stern and fired "Y" gun charges. All charges were set at 50 ft. and functioned properly. After the explosion of the starboard "Y" gun, the executive officer of *S. C. 215* saw débris and oil rise to the surface.

After bombing, *S. C. 215* and *S. C. 128* turned to head for the *S. C. 129*, which had previously reported a submarine and was at this time laying to with her engines disabled.

Capt. Nelson commended the efficient manner in which the submarine chasers carried out their duties, in particular the chasers of unit "B," who destroyed two submarines out of three. One of these submarines was destroyed by a subchaser which had broken down and was acting by herself.

SINKING OF THE "BREMERHAVEN."

2 October 1918.

(10143 O–10–a.)

On 2 October 1918, at 6 a. m., the group of armed trawlers belonging to the 2d E. M. S. Outpost Half Flotilla, following the usual routine, proceeded to sea in order to relieve trawlers of the 1st E. M. S. Outpost Half Flotilla, which were stationed at a certain position as light vessels. At about 11.15 or 11.30 p. m. the *Bremerhaven*, one of the trawlers, arrived at her new position and anchored. She had been riding to her anchor for about 10 minutes when two destroyers flashed their searchlights on and circled round her. As a number of German torpedo craft had been seen when the *Bremerhaven* was at her first anchorage, the destroyers were taken for German vessels. The recognition lights, consisting of a red and a white light, horizontal, were switched on, and the signal "UD" (Who are you?) was made three times. In spite of receiving no reply, the *Bremerhaven* then showed her "massnahme" (i. e., lights which these vessels exhibit while acting as lightships), whereupon the destroyers opened fire on her at a range of about 330 yards. The first salvo hit her forward, one shot penetrated the forecastle, killing several of

the crew and destroying the companion ladder; the second salvo hit her amidships; and a few minutes later, after the destroyers had taken up a new position, a third salvo hit her aft. The firing was so effective that the crew of the *Bremerhaven* did not offer any resistance whatever. The destroyers continued to fire at the *Bremerhaven*, and it was seen that shells hit the engine room. While the survivors were struggling in the water, they came into the range of the destroyers' searchlights. The guns then stopped firing until the men were clear of the line of fire. After having been in the water for about 20 minutes, the four survivors were rescued by H. M. destroyer *Sylph*.

THE BOLSHEVIK NAVY.

28 November 1918.

(10965–A C–10–g.)

The following account was given by Lieut. Tschaplin, who arrived recently at Copenhagen, having embarked as a sailor on board the Russian steamship *Ocean*. The ship before the war was a school ship for naval engineers and has a crew of 250 belonging to the navy. The ship left Petrograd on 6 November, stopping at Reval and Stettin, where the Bolsheviks had difficulty with the Germans. The ship arrived at Copenhagen on 15 November. Second Lieut. Tschaplin, of the Russian Navy, gave the following account of the Russian Navy under Bolshevik rule. Details are not vouched for:

The authority on board was vested in two elected committees, the sailors' committee (12 members) and the Bolshevik committee (12 members). The president of the Bolshevik committee is member ex officio of the sailors' committee. The sailors' committee have charge of all technical questions and everything relating to life on board. The Bolshevik committee has charge of political questions. It is then their duty to handle all anti-Bolshevik persons that may be discovered on board, and to watch that the Bolsheviks' faith is kept "pure and undefiled." Most of the members of this committee have been chosen because of some special praiseworthy action, such as a violation of the civil law prior to the war or one or several assassinations of officers since the outbreak of the war.

The officers are merely expert advisors, who enjoy no disciplinary powers. If someone is at fault the captain may demand of the president of the sailors' committee that punishment be given the guilty, but as yet there has been no case of his daring to make such a demand. The sailors never receive less than 800 roubles a month in wages. Officers and men receive about the same salary. The commanding officer salutes the other sailors first.

There was neither order nor discipline on board. Nothing was taken care of. It took two days to do what ought to have taken two hours. Everybody commanded and no one obeyed. The day passed in playing cards, drinking, and fighting. Blood flowed frequently, so the surgeons were kept busy. Most of the men had venereal diseases.

For entertainment there were lectures as to the perfection of the Bolshevik doctrine. These were gotten up by the members of the Bolshevik committee, who had taken a four-months' course at the Bolshevik school of propaganda, or there were lectures where the mass was parodied, and where sailors disguised as priests chanted obscene verses accompanied by church music.

RUSSIAN BALTIC FLEET.

Source: Reliable.

12 December 1918.

(11055 C–10–h.)

In addition to the *Petropavlosk* there are three other dreadnaughts in Petrograd, which have been in part dismantled, but neither the guns nor the engines have been removed.

The *Petropavlosk* was lying in the docks at Cronstadt, but was to have left there on 2 December. It has a complete fighting equipment and has recently taken several officers on board.

The *Andrei Pervosvanni* is lying armed in Cronstadt.

The *Imperator Paul 1st* (now *Respublika*) is in Cronstadt, but dismantled, her largest guns having been sent to the front.

The *Rurik* is lying in Cronstadt, dismantled.

The *Admiral Makarof* and the *Bayan* are in Petrograd and have in large part been dismantled. The large guns of the latter have been removed.

The *Oleg* and the *Bogatyr* are allowed to be fully equipped with the necessary guns, ammunition, etc., and recently left port.

Destroyers of the *Novik* type are in Petrograd.

The *Podieditch*, *Zabiaka*, *Samson*, *Desna*, *Iziaslav*, *Gavriil*, *Konstantin*, *Kapitan Isilmetieff*, *Miklouka Maklay* have been dismantled; the guns, however, have not been removed.

The *Novil*, *Orphey*, *Litoun* have been placed in the yard for repairs; the guns of these boats have been removed.

Seven destroyers of the *Straschni* type are lying dismantled in Petrograd; their guns have been sent to the front.

Four destroyers of the *Armouriez* type are fully equipped.

Three destroyers of the *Moskivitianin* type are in the Volga.

Fifteen destroyers of the *Vnimatelny* and *Raziastchy* type are lying dismantled in Cronstadt.

Out of the eight destroyers of the *Lovky* type, four are equipped; these are the *Lovky*, *Mostchy*, *Lehky*, and one other. The other four are lying dismantled in Cronstadt.

The gunboats *Khivinetz*, *Groziashski*, and the *Krabry* are lying dismantled in Cronstadt.

The ice breaker *Jermack* is lying in good condition in Petrograd. The sailors of this ship are thought not to be Bolsheviks.

NOTE.—(As the *Jermack* is the only ice breaker in the possession of the Bolsheviks, it might be of interest to the allies to get this ship out of Petrograd, especially as it would be very useful to the allies in any operations in the Gulf of Finland undertaken before the breaking up of the ice.)

About 10 per cent of the former officers really belong to the navy; the others have been promoted to officers from the revolutionary element. Some have remained in the navy on account of the pay, and a very small number of them remained in order to keep the vessels in good condition. At present, on account of the state of "long anchoring" in which the fleet is kept, the number of officers has been reduced and those who were not needed have been sent to the Red Army. The following list is approximately correct: *Petropavlosk* has 15 officers; *Russie*, *Gromboi*, *Bayan*, *Admiral Makarof*, *Paul 1st* (now *Respublika*), *Grajdanine*, *Aurore*, *Diane* each have five officers; the destroyers of the *Novik* type have each two officers; the coal-burning destroyers have only the commander and two principal mechanics for each division. Lately a large number of officers, about 100, have gone over the frontier to Finland and Esthonia in order to escape being enrolled in the Red Army.

SAILORS.

Out of the total number, about 60 per cent have been serving during the war; the remaining 40 per cent is composed of workmen, red guards, and others who have never worked as sailors before.

The political views of the crews are not exactly known. It is believed, however, that they are mostly against the Bolsheviks. Those that belong to the reserve are the most discontented. They were called up in September, and since that time they have received no salary. They are quartered very miserably in the barracks at Cronstadt. The crews, although being greatly reduced, are still sufficient to man the boats in commission. The *Novik* boats have a crew of 75 men; the dreadnoughts, 500; *Andrei Pervosvanni*, 500; *Paul 1st* and *Rurik*, 200; *Russia*, *Gromboi*, *Admiral Makaroff*, *Bayan*, *Aurore*, and *Diane*, from 50 to 100; the smaller boats have crews in proportion to their state of fitness.

From Information from Another Source.

OFFICERS.

The number of officers has been considerably reduced, but many have left. There are still about 10 per cent of the late officers; the others are mostly young men who have been promoted during the revolution and who have been taken from the mercantile marine.

The "proletariat officers" have not yet appeared, but there is great talk about them. The majority of the officers stay in the service solely on account of the wages, as they are not capable of any other work. Many hope for a change in the situation, and are trying as much as possible to safeguard the interests of their country. It is thought that there are very few officers who are really convinced of the rights of the Bolsheviks even though they may pretend to be. There are also some officers who are ready to fight against Bolshevism when the right moment arrives; they are in contact with various organizations. The other officers would in all probability go with them.

SAILORS.

There are very few of the old sailors, but the recent mobilization has increased the number. The mobilized sailors are mostly anti-Bolsheviks, but fear makes them keep quiet. The majority have been sent to Cronstadt, from where they are sent to the front; this has been the cause of great discontent. The remainder have become sailors as a result of the revolution—many are red guards, the unemployed workmen, thieves, and criminals, etc., who are glad to be able to get better pay than their comrades and to be well fed and well clothed. There are also a few students. There are quite a number of Bolsheviks amongst the sailors, especially on the warships and on the cruisers *Oleg* and *Bogatyr* (the crews of the two last-mentioned ships are principally composed of Letts and Esthonians), but one can never be sure of them, as they are always ready to do the thing that is most advantageous for themselves.

ITALIAN BATTLESHIP CONSTRUCTION—ABANDONMENT OF "CARACCIOLO" CLASS.

25 November 1918.

(2794 O–11–b.)

The construction of four battleships of the *Caracciolo* class, undertaken before Italy entered the war, has been definitely abandoned and the contracts are to be rescinded. It will be recalled that during the war much of the material already used in the construction of these ships was removed from the unfinished hulls to be used for other shipbuilding work.

ATTEMPT TO SALVAGE BRITISH COLLIER "WELLINGTON."

Source: Report from Lieut. F. W. Brown, U. S. C. G.

16 September 1918.

(10449 A U–4–a.)

On 16 September 1918, at about 11.30 a. m., the British collier *Wellington* (5,500 tons), Newport to Naples, with coal, was torpedoed while in convoy Pica to Gibraltar, with the U. S. S. *Seneca* as ocean escort. The torpedo struck close to her stem on the starboard bow, tearing away her forefoot and flooding her No. 1 hold. The submarine porpoised close to the collier's bow and disappeared. The merchant crew had immediately abandoned ship, and shortly after a semaphore signal was sent from one of the ship's boats to the effect that No. 1 hold was flooded, that the ship would probably float, but that the crew refused to remain aboard.

Lieut. Brown requested and obtained permission from the commanding officer of the *Seneca* to take a volunteer crew and endeavor to work the collier into port. Nineteen volunteers were selected from the personnel of the U. S. S. *Seneca*. As the crew of the collier scrambled out of their lifeboat the volunteer crew dropped into the same boat and shoved off. A hasty organization was outlined en route to the torpedoed vessel. Immediately upon boarding ammunition was broken out and the gun's crew drilled until familiar with their duty and lookouts were immediately posted, as another attack from the submarine was expected at any moment. Shortly after boarding the collier a second boat load, containing the master, first and second officers, and 11 of the *Wellington's* merchant crew also came on board. By this time the *Seneca* had left to rejoin her convoy.

Mr. Boyce, warrant machinist, immediately assumed full charge below deck and shortly made the report that there was 120 pounds of steam, that slight repairs were necessary to the air pump, and that all would be ready for steaming within half an hour. Soundings showed that No. 2 hold was dry. At 12.50 p. m. the ship went ahead slow, but a stop was made to work up a better head of steam. At 2.10 p. m. went half speed ahead, gradually increasing, and soon made speed of 7½ knots; laid course for Brest.

As soon as the vessel was well under way all the gun's crew excepting two were turned to constructing a large life raft of heavy joists, which was laid down upon the No. 3 hatch, everything being cleared so that it would float off. Frequent soundings were taken and the water rose in No. 2 hold to a depth of 3½ feet, where the pumps held it. Radio operator being able to intercept messages from the *Seneca*, it was considered that all necessary information

would be received from that source. As long as the weather held clear no difficulty was experienced in holding the course, but in order to do so a speed between 6 and 7 knots had to be maintained. There being but six men from the engineer force, other men were sent to their aid. Although they had never performed such duty before, every man took turn about in passing coal and firing, coming up on deck when relieved, and then taking a gun watch. The spirit and interest with which all the men worked is well illustrated by the manner in which the cook performed his duty. Immediately upon boarding the collier he disappeared into the galley and before 2 o'clock had provided all hands with an ample dinner. When he appeared on the bridge with the dinner he was clad in an immaculate white serving jacket and there was omitted no detail of service. (Unfortunately when the ship sank later this man was lost.)

During the afternoon all went well, but at sundown the wind and sea came up, gradually making it impossible to keep the *Wellington* on her course. By 6.45 p. m. it became necessary to stop, as being down by the head the ship came up head on to the sea. By 7.15 a good head of steam having been worked up she was again brought back to her course, only later to repeat her former maneuver. An effort was then made to steam stern first and keep her stern to the sea, but this attempt failed. As the vessel was fitted with steel towers instead of spars there was not enough gear about to improvise a drag that would have been of any use. Neither could the cable be gotten at. When the steerage way was lost the seas crashed over the starboard bow and up through No. 1 hatch, rendering the entire forward waist unsafe. The arbor deck acted as a diving rudder, giving the seas a chance to force her nose down even when the vessel was stopped. Considerable water had seeped through into the coal from a bent plate in the arbor deck where she had been torpedoed a few months previous.

The lifeboat, a big double ender, with air tanks and a capacity of 41 persons, was carried rigged out on the port side ready for lowering. Due to the port list and the rolling of the vessel the davit heads threatened to force the boat under on the down roll. Seeing that no time was to be lost if this boat was to be gotten away all hands were mustered abreast of it with the exception of three men to keep the pumps going and were ordered to lay into the boat. If possible they were to hold on to the lee by use of a long sea painter, otherwise to lay off ready to pick up those remaining aboard in case of the *Wellington* sinking. The radio operator, M. S. Mason, was the only man not at the muster, he remaining at his instruments to keep in touch with the U. S. S. *Warrington*, which was coming to help. At the order to lay into the boat most of the British merchant crew climbed

in, also one of the *Senaca's* men. Some one chopped the stern fast and the boat worked out ahead and drifted up to windward.

About 2.30 a. m. the *Warrington* had arrived and gotten the men from the lifeboat aboard. The boat, however, was crushed. In the darkness as the collier settled by the head the *Warrington* had great difficulty in picking up the survivors, most of whom grasped the life rafts and wreckage as the boat foundered shortly before 4 a. m., nearly 17 hours after being torpedoed. Many of the men were in the water as long as three and a half hours before being picked up. Several of the crew of the *Warrington* showed great heroism in jumping overboard to rescue survivors. Eleven of the volunteer crew from the *Seneca* were lost.

SPERRBRECHER.

Source: German Deserter.

28 October 1918.

(10498–F U–2–i.)

At Geestemünde there were stationed 12 Sperrbrecher, old cargo-boats, armed with one gun of 5.3 cm. on the bow. These ships were intended to clear the way for the regular naval forces through the allied mine fields and were laden with cork so as to prevent sinking when striking a mine. Informant had no recollection of these Sperrbrecher having ever operated in the North Sea, but he said they took part in the action against Riga.

SUBMARINES.

U–BOAT ORDNANCE.

3 December 1918.

(9698 E–12–d.)

The following notes are extracts from an intelligence report in regard to the ordnance of submarines surrendered by Germany:

U–120.

One 5.9-in. gun, 45-caliber, forward sliding plug side, Krupp design.

U–124.

One 5.9-in. gun forward, 1917, Mark I Krupp design, 45-caliber, sliding block, fitted with muzzle and breech disks to secure when submerged. The muzzle disk is secured to gun muzzle by a clamp on top of the chase. The breech piece fits in powder chamber and clears block when sliding in the same as the base of a cartridge case. No fire control.

U–135.

One 5.9-in. gun, 45-caliber, forward. Three meter stereoscopic, housing type of range finder, Zeiss design Mark I, No. 4. Range-finder tests on bearings cast to arm, which is secured to pedestal. Around range finder is a cast cylindrical cover about $\frac{1}{2}$-in. in thickness. Firing rods operated by pad at pointers station trips sear and releases firing pin. A lanyard can also be secured to eye and firing be done from plug.

U–153.

Two 5.9-in. guns, 45-caliber length, one forward and one aft of conning tower, Krupp 1917, sliding plugs on side. The depth of rifling in 5.9-in. guns is about $\frac{1}{16}$-in. diameter. Steel of gun appears like nickel steel with composition tin coating. Powder chamber is cylindrical, not conical. Pitch of rifling at muzzle, 1 in. to the foot. Appears to be *uniform* twist. Clearance between rear of tube and forward face of plug, $\frac{3}{4}$ in., allowing space for breech disk to house and secure against water in tube.

In men's compartment forward was found a range finder about 4-foot base. This was removed and taken away. It was apparently to be mounted on a stand forward of compass binnacle forward of conning tower. It could be readily whipped up forward hatch and carried by hand to mount.

General remarks.—For guns which do not house, the rifling of all guns is well oiled and in good condition. The muzzle and breech tompions seem to keep inside of bore quite dry.

Appearance indicates that rifling is uniform twist.

Steel is apparently nickel steel and coated with composition tin in breechblock.

Breech of all guns operates well and sufficiently heavy to be reliable. It is also simple.

All guns use fixed ammunition.

At high angles of elevation, a smaller rammer is used to ram shell home.

Crew for 5.9-in. probably consisted of pointer, trainer, sight setter, plugman, shell man, two powder men, and rammer man; total of eight men.

Clinometer apparently recently installed at right of gun is for use in always firing on even keel to reduce errors for deflection of firing on roll.

Communication of spots and ranges is by megaphone.

No range keepers used.

On large subs 3-m. range finder available. Otherwise no other fire control.

Binoculars used for spotting.

Fore guns could not be used much in rough sea.

Operation.—When *submerged*, range finder is housed and cover fits down tightly over pedestal made water-tight and locked with gaskets.

In this position all air is exhausted under piston, and housing cover is locked by slats at top of tube.

The objectives of range finder are protected by covers operable by rods which keep water from objectives.

On the surface, air is turned on tube piston from engine room by valves. A relief valve is filled which prevents too great pressure against tube when air is on, tube rises slowly and comes to a stop at top of travel.

Air pressure holds tube up. In the *U–139*, there is also hand mechanical gear to hoist tube.

With range finder up, covers are removed from objective.

To adjust.—Close shutter to objective and turn on lamp to provide inside illumination.

Move knob to bring vertical wire over center triangle and note range reading. By moving points, the infinity is adjusted.

Range finder may be trained all around by operators standing up between two arm and elevation about 20°.

The observer then turns on object and moves knob until object remains under center triangle if he has stereoscopic vision.

Range finder was probably used to track convoys, mark torpedo approach, and get initial range to guns.

Can be housed in 30 seconds.

Good against aeroplanes.

Water-tight—good optics.

SHIP'S BOOK OF "U.B.–110."

November 1918.

(10954 U–4–A.)

SHIP'S BOOK OF "U.B.–110."

[Entries made by dockyard authorities.]

BLOHM & VOSS, *Hamburg.*

Completed: 23 March 1918.

(Signed) JUST,
Marine Baurat und Baubeaufsichtigender
(*Naval Constructor and Inspector*).

Table of Principal Details for the Use of the Commanding Officer

Building yard: Blohm & Voss, Hamburg.
Laid down: 10/7/1917.
Launched: 1/9/1917.
First commissioned: 23/3/1918.

Maximum length over all	181.4 feet
Maximum breadth over rubbing strakes	19.3 feet
Breadth over frames	19.0 feet
Height from under-side of keel to—	
Top of superstructure at middle length	16.3 feet
Top of longest periscope (housed)	26.4 feet
Top of longest periscope (hoisted)	40.9 feet
Draught (surface) of the boat with full equipment, trimmed for 1 ton residual buoyancy	12.1 feet
Surface displacement of the boat fully equipped and trimmed for 1 ton residual buoyancy, and with oil fuel tanks filled	510.3 tons
Submerged displacement, including ballast tanks,, but without free flooding spaces	639.1 tons
Total form displacement submerged	717.9 tons
Capacity of ballast tanks	128.8 tons
Length of the pressure hull	131.2 feet
Maximum diameter of pressure hull to outside of plating	12.8 feet
Thickness of pressure hull plating	.43 inches
Authorized diving depth	164 feet
Effective horsepower—	
Of main engines (continuous performance)	2 by 550 horsepower
Of main motors (for one hour)	2 by 394 horsepower
Number and type of propellers	2 three-bladed propellers

Armament.

Guns.—One 10.5-cm. (4.1-in.) (Ehrhardt), mounted at outer frame 64.

Ammunition.—(*a*) In pressure-tight cases: 22 rounds in superstructure, frames 58–61 (outer); 12 rounds in superstructure, frames 47–49 (outer).

(*b*) In nonpressure-tight cases: 124 rounds inside pressure hull, frames 37–40 (inner).

A pressure-tight 10.5-cm. (4.1-in.) cartridge case weighs when empty 16.3 kg. (35.9 lbs.); with cartridges, 38.72 kg. (85.32 lbs.), and displaces 12.96 lit. (.46 cu. ft.)

A nonpressure-tight case weighs when empty 7.8 kg. (17.2 lbs.); with cartridge, 31.83 kg. (70.173 lbs.).

Machine guns.—One, at outer frame 50 when at the firing position; there is also a pivot mounting at outer frame 54½ on the periscope support.

LOG OF "U.B.–110."

(10954 U–4–A.)

The log of the *U. B. 110* affords a good idea of the very strenuous routine carried out by German submarines during their period of trials and preparation for active service.

The log shows that *U. B. 110* carried out torpedo-firing practice on 26 occasions. The summary of runs specified on 19 of these occasions is as follows:

15 daytime practices	55 runs submerged. 2 runs on the surface.
4 night practices	19 runs on the surface.

Assuming the same average number of runs to have been made on the remaining five days and two nights for which no actual figures are given, *U. B. 110* must have fired over 100 torpedoes before proceeding on service.

U. B. 110 was sunk at 3.30 p. m. (German time) on 19 July 1918, when in the act of attacking a convoy about 3 miles southeast of Hartlepool.

She was first attacked with depth charges by *M. L. 263*, and then rammed by H. M. S. *Garry* (vide Anti-Submarine Information, O. N. I., Compilation No. 14, 1918, p. 7).

RESULTS OF SOUND TRIALS WITH "U.B.–110."

Source: German Documents.

28 May 1918.

MOST SECRET:

Wind, NW., 2–3; weather, cloudy; sea, 2.

Depth of boat (to keel), 11 m. (36 ft.).

1. MAIN MOTORS.

(*a*) *Starboard motor.*—Up to 120 revs., faint. Over 120 revs., fainter at first; with increasing number of revs., throb of propellers became louder.

(*b*) *Port motor.*—Up to 140 revs., faint. Over 140 revs., as for starboard motor.

2. AUXILIARY MOTORS.

Very loud: After hydroplanes when in "Power." Main ballast pump (distinct note).

Loud: Forward hydroplanes when in "Power." Steering engine. Periscope observer's platform (generally not in use). Compressor.

Faint: Steering gear and hydroplanes in "Hand." Trimming pump. Ventilating machinery. Transformer for order transmitters.

Inaudible: Transformer for gyrocompass.

3. INSTRUCTIONS FOR AVOIDING PURSUIT WITH HYDROPLANES.

Run starboard motor up to 120 revs. only.

Run port motor up to 140 revs. only.

Work steering gear and hydroplanes by hand.

Trim with compressed air.

Blow with compressed air.

Use periscopes cautiously.

Do not start compressor.

Should the pursuer be in the immediate vicinity, do not start ventilating machinery; stop transformer for order transmitters.

Maintain silence in the boat.

In the stern compartment and with your own hydroplanes, look out for sounds made by your own propellers or coming from the boat, and take measures to eliminate them.

NOTE.—The deeper the boat is below the surface, the higher is the permissible speed, since with the increase in water pressure the throb of the propellers does not manifest itself until a higher number of revolutions is reached.

4. INSTRUCTIONS FOR USING THE BOAT'S OWN HYDROPHONES FOR OBSERVING ENEMY VESSELS WHEN YOU YOURSELF ARE UNDER WAY.

Run starboard motor up to 120 revs.

Run port motor up to 140 revs.

Auxiliary motors may be used, but the forward hydroplanes should be used as little as possible.

5. It is necessary to listen occasionally to the main engines from the stern compartment so as to be able to detect at once any alterations in the throb of the propellers.

6. The personnel is trained in the method of determining the course by means of the navigational cable.

NOTE.—The statement to the effect that submarines become less audible within the increase of depth has not been borne out by investigations.

GERMAN DIESEL ENGINES.

October 1918.

(10406–O U–4–a.)

The M. A. N. Works at Nurnberg, which formerly specialized in two-cycle Diesel engines for submarines, no longer supplied these engines, and as a consequence the Augsburg Works, where 4-cycle engines are built, worked at full pressure both night and day, and employed about 5,000 skilled workmen solely on Diesel engine con-

struction. Two-cycle Diesel engines were still being turned out at Nurnberg for land installations, more particularly for power stations. It is believed that the demand for M. A. N. 4-cycle Diesel engines had been so great, owing to their superiority over other types of Diesel engines that they were being made by subcontract at the Blohm & Voss Works, Hamburg, where 550 B. H. P. engines are constructed, and also at the Schwartzhopf Works, Berlin.

In June, 1917, the M. A. N. Works at Augsburg were constructing the following types of Diesel engines:

(*a*) 6-cylinder, 4-cycle, 530 B. H. P. at 450 revs. per minute.

(*b*) 6-cylinder, 4-cycle, 1,200 B. H. P. at 450 revs. per minute.

(*c*) 6-cylinder, 4-cycle, 1,800 B. H. P. at 450 revs. per minute.

Diameter of cylinders about 21 inches.

The following type was on order:

(*d*) 8-cylinder, 4-cycle, 3,000 B. H. P. at about 350 revs. per minute.

In December, 1917, the following were seen on the testing stands at Augsburg:

Two of type (*a*), one of (*b*), two of (*c*), and two of (*d*). From prisoners' statements it is believed that the design of the larger engines was in the main similar to that of the 530 and 1,200 B. H. P. engines. Briefly stated, all sizes of M. A. N. Augsburg Diesel engines are as follows:

1. 4-cycle reversible air-stating.
2. Air injection, with a 4-stage compressor driven direct off the forward end of the crankshaft.
3. Pistons made in one piece and oil-cooled. The main lubricating oil pump is driven off the engine, and pumps lubricating oil for piston cooling as well as for the bearings. A motor-driven stand-by lubricating oil pump is also provided.
4. No crossheads are fitted.
5. Cam shafts are driven by bevel gearing inclosed in oil baths.
6. Separate cylinder liners fitted.
7. No balance weights fitted to cranks.
8. Only one inlet and exhaust valve fitted per cylinder.
9. All types drive through a friction coupling (Bamag & Lohmann).

The superiority of the M. A. N. 4-cycle Diesel engine appears to lie in its simplicity, efficiency, and reliability. The M. A. N. Augsburg Works have been constructing 4-cycle Diesel engines for many years, and have thus gained great experience, whereas other firms, such as the Korting, Benz, and Daimler, have only built 4-cycle Diesel engines since the beginning of the war. It is stated that the Benz Diesel engine is now beginning to excite favorable notice on account of its lightness, and it is believed that, when sufficient ex-

perience has been gained, this type of Diesel engine will prove to be superior to the M. A. N.

The Germania Yard still built large 2-cycle Diesel engines of 1,200 and 1,800 B. H. P., whereas the engine castings of 2-cycle engines were formerly of bronze on account of the trouble experienced with castings of semisteel. This difficulty has now been overcome and the use of bronze abandoned.

With Germania engines, port scavenging is employed, a 1-stage scavenging pump being driven off each end of the engine and discharging at a pressure of about 10 pounds per square inch. The pumps are fitted with plate valves, and are not water cooled.

SUBMARINE SILENT RUNNING SPEED.

Source: Reliable.

2 November 1918.

(10731 F–6–H.)

It has been ascertained that a submarine can remain stopped while submerged for a considerable length of time. The *AL–1* on a recent patrol remained stopped for six hours at a depth varying between 65 and 80 feet, having started its engine only once for about two minutes. During this time the ballast pumps were run every two or three minutes.

German prisoners from a sumbarine have stated that, when they were surrounded by chasers with listening apparatus or near an enemy patrol, the submarine plunged to a depth of 20 or 30 m. and assumed "silent running." The engines were run at 80 to 100 revolutions (speed about 1.8 knots), the submerging rudder at 0, ready to maneuver in case of necessity. The use of the pumps or waterclosets was forbidden. After having thus continued under way for an hour the submarine rose to 11 m. and projected its periscope, then replunged if the patrol was still in sight.

On another submarine the engines were run at only 60 revolutions and with a single motor. When pursued by chasers a zigzag route was followed.

COMMUNICATIONS.

NOTES ON HYDROPHONES.

November 1918.

(10794–A, 10794–B; U–4.–a.)

The following comments are compiled from the report of Capt. R. H. Leigh, U. S. N., who has had experience overseas with the various listening devices during the past twelve months; from Ad-

miral Sims' official bulletin; and from the results of experiments conducted at New London.

THE "C" TUBE.

Of the original type "C" tube, none are now being installed. This device was never very satisfactory at sea, particularly if it were at all rough, owing to the impracticability of handling it under such conditions. A tube of this kind was used by the British on the *Whitby Abbey*, which was the flagship of the officer directly in charge of the Otranto barrage, who has made successful use of the apparatus. The *Whitby Abbey* is a merchantman converted into an auxiliary cruiser. Its engine-room force is so well trained that all auxiliary noises can be quickly stopped. The captain has had some interesting chases using this device, but has not made a successful attack.

THE "S. C. C." TUBE.

The "S. C. C." tube is a modification of the "C" tube. It is part of the standard chaser equipment and is perhaps the most rugged, serviceable, and popular instrument they have. Under good weather conditions it is very statisfactory. Its range is better than that of the M. B. tube but it is not so free from water noises. Unfortunately the chasers have a heavy guard around the hull a short distance above the water line so that it does not take very much of a sea to cause considerable water noise, due largely to the flapping of water against this guard. This can be overcome to a certain extent by putting the vessel stern to wind, but it must be remembered that always, after a comparatively short interval, the vessel will fall off and lay in the trough of the sea, where water noises are considerable when it is at all rough. A sea caused by a wind of force four when white caps are abundant is sufficient to make listening, except to loud noises near by, exceedingly difficult with this device.

The range varies with water conditions. Under favorable conditions surface craft have been located when 7 or 8 miles away and on the Otranto barrage fast-running destroyers up to 12 miles.

Noise interference from other vessels is very disturbing. The device is not sufficiently selective to eliminate such noises to any appreciable extent. However, it reproduces very accurately, so that it is an easy matter for a trained listener to discriminate between various sounds. The device very seldom makes an error of over three degrees. The device is rugged, simple, easy to operate and to keep in condition. It is seldom up for repair.

THE "S. C." TUBE.

This tube is an adaptation of the "C" tube to sumbarines. It has given excellent service in submarines and has been very useful

to them. It has the disadvantage of insufficient selectivity, but is part of the best equipment so far found for this type of craft.

THE "K" TUBE.

The drifting "K" tube is part of the standard submarine chaser equipment. It is a long-range device for drifting patrol work, which has been found satisfactory when used in drifting patrols, but can not be used in the chase to any advantage, as its operation requires the chaser to be stopped with no way on her and all auxiliaries shut down. The time required for an observation is entirely too long when in pursuit. Very few listeners really understood the proper way to get the direction of a sound with this device. Having three scales complicates the work and the average reader makes an error of about 15 degrees in getting the direction of the sound. It takes an especially well trained man to get within 10 degrees. The advantages and disadvantages of this device follow:

1. *Advantages.*
   - (*a*) Very sensitive, therefore long range.
   - (*b*) Freedom from water noises, can be used in rough weather.
   - (*c*) Handiness in handling.
2. *Disadvantages.*
   - (*a*) Very sensitive to sound interferences from other vessels.
   - (*b*) Time required to stream the triangles and take observation. Must stop ship at least six minutes to stream, observe, and take in the device.
   - (*c*) Insufficient accuracy.
   - (*d*) Three scales to read, making direction getting difficult to the average observer.
   - (*e*) Danger caused to vessel by stopping long enough to observe.

The ideal use of the device is in either drifting or anchored patrol in an area free from shipping. It is not a practical device for use in chasing submarines.

The "K" Tube Tank Installation.

To adopt this for destroyers the receiving units were installed in one of the forward trimming tanks and listening done during coasting periods. The intention was to give them something with which listening could be carried on while under way and without the loss of time required to launch and reel in a drifting set. However, tank reverberation and ship's own noises interfered to such an extent that operation was not satisfactory, and this type of installation will be discontinued.

The "K" Tube Overboard Boom Type.

An alternative arrangement, having the triangle of the drifting set hung from a boom and lowered into the water for listening during "stopped" periods, has given slightly better results. Its installation is inexpensive and can be accomplished without docking the vessel, but it has the same disadvantages of interference from other shipping that the "K" tube has. It can be put over, a bearing taken, and be pulled on board in about four minutes by a well-drilled personnel, but to do so requires silence of all machinery noises and dead stop.

"K" Tube Deck Mounting.

For submarines, the deck-type "K" tube has been evolved and in conjunction with the "S. C." tube it is the best installation so far developed for this class of vessel.

THE "O. S." TUBE.

A large number of comparative tests have been conducted with it by the British off Weymouth, and from these reports and from conversation with our listeners who have used it can be gathered the following: The "O. S." tube, generally speaking, is an efficient towed device, the best developed by our Navy to date. It is comparatively simple, has good range, good direction, and is capable of quick observations. The nonselective feature is its weakness; it seems even more than ordinarily subject to traffic interferences. The "O. S." tube uses the standard "K" tube rats, reels, deck cable, and compensator. The fish supporting the microphones are exceedingly rugged and will stand hard abuse. The spreader, however, can be damaged from rough usage. The "O. S." towing device is not usable as a drifter set since the fish are heavier than water and sink when the device comes to rest, thus open-circuiting the microphones and changing the conformation of the listening triangle. Any towed device has the inherent defect of requiring towing. The ultimate aim must be a device attached directly to or constituting a part of the ship's hull. When towed at a speed over 15 knots the tube jumps out of the water. Of course, this depends to a certain extent upon the height of the securing post on the ship above the water.

Comparison of "O. K." Tubes and Multiple Unit "U–3" Tubes.

The "K" tube and "O. S." tube are very satisfactory listening devices, but neither can be used for combined drifting and towing. The evident advantage of a single apparatus capable of performing both operations led to the development of the "O. K." tubes and the multiple-unit "U–3" tubes.

The "O. K." tube is acoustically comparable with the "K" tube as a drifter and the "O. S." tube as a towing device, with the great advantage of one instrument performing the combined duties of the two. This tube at present shows very good mechanical performance in the water.

The "U–3" tube is composed of two C–1 eels. The experimental work which has resulted in the present forms of microphone eels was begun by Prof. Hayes about the middle of March, 1918. The tests which had been carried out on the U. S. S. *Aylwin* and those which were at that time being carried out on the U. S. S. *Jouett* showed that the local noises, such as splashing of water on the hull of the boat, auxiliaries, and other noises within the boat, and the engine and propeller noises, were such as to seriously hinder all the listening devices installed on these boats at that time from operating successfully. This fact suggested the urgent need of a detector device which could be towed far enough astern to eliminate most of these disturbing noises.

These towing detector devices have, from their shape, been called eels. They consist essentially of two or more submarine receivers definitely spaced in a line and surrounded by a rubber tube which in operation is kept filled with water. The two ends of the tube are stopped by steam-lined blocks, the rear one carrying fins while the front one admits the towing cable through a stuffing box.

The direction given by an eel is, from conditions of symmetry, necessarily ambiguous as regards port or starboard. This ambiguity can be removed by taking a second reading after the course of the listening boat has been changed a few degrees. Prof. G. W. Pierce suggested the possibility of removing this ambiguity by trailing, parallel to the first eel, a second eel carrying one receiver. To determine whether a source of sound is on the port or starboard it was proposed to substitute for one of the receivers in the "two-spot" eel the one in the "one-spot" eel. The horizontal distance between the two receivers need not be definite or definitely known.

Experiment shows this suggestion to be practicable. Two similar "two-spot" eels towed by equal lengths of cable and separated 8 feet at the stern of the boat not only made possible the removing of the ambiguity in directional readings as given by a single eel but fairly good direction was given by the cross settings.

A careful study of actual test data, together with the combined opinions of several observers based upon a large number of tests, brings out the following conclusions:

On account of their selectivity, the eels, with their multiple-unit feature, show superiority acoustically over the "O. K." tube when the boat has sufficient headway through the water to keep the eels lined up and properly spaced. This condition is attained during

towing and during gliding and drifting when the wind force is about 1 or over. During a number of tests made to compare the two devices as drifters, both of them operated with substantially equal satisfaction. Under conditions of a dead calm, or in cross-tidal currents, neither can be considered reliable as to direction, as there is nothing to indicate the true condition assumed by the devices in the water. Under such conditions the tubes act principally as sentries. It is believed for theoretical reasons that when there is no motion of the devices through the water the "O. K." tube would have the advantage, because it maintains a horizontal position under all conditions while the eels have a tendency for the tails to sink lower than the heads. This condition, however, has not been encountered in the tests.

No ambiguity of direction as to whether a sound is on the port or starboard is present with the eels, except generally for angles about 20° either side of the bow and stern, and for very weak sounds. Under other conditions the shift of the sound toward port or starboard is clear and definite. The test data shows that when a sound is faint enough to give ambiguity on the eels it also gives a doubtful setting on the three scales of the "O. K." tube.

Greater speed in getting a setting can be made with the eels, which require but one setting of the compensator handle and a quick change of a switch to determine port or starboard angles.

The ranges of the two instruments on a single sound are not very different, but either in the presence or absence of disturbing interference the power of selectivity and focusing by the eels gives them a slightly greater range.

The effect of water noises up to 10 knots is practically negligible and of the same magnitude on each device. When the engines are shut off at 10 knots listening can be started almost immediately.

The eels are subject to a phantom or image sound coming in at a different angle which appears to the ear about one-quarter as loud as the main sound. This image is characteristic of all multiple-unit devices, but is not very noticeable except for strong sounds.

For sounds near the bow and stern the "O. K." tube has an advantage in the triangular spacing of the units with the three scales, and in cases of two similar sounds coming at the same angle on both port and starboard side.

When listening under way, the selectivity on the eels makes it somewhat easier to focus out the ship's own noises and to pick up other ships, especially on beam angles.

From a mechanical standpoint, the "O. K." tube is simpler in construction, easier and quicker to repair, and slightly quicker to throw overboard. The eels are somewhat more rugged and less liable to entangling and catching on obstructions in the water.

SUMMARY.

Summing up the advantages of each, the following conclusions have been reached:

1. Due to their selectivity, the eels excel in acoustical qualities and have greater ability to discriminate a desired sound from interfering sounds.

2. The eels are more rugged and are less liable to become fouled due to obstructions. Endurance tests are now under way to determine the relative merits of these devices at speeds of 20 knots or more.

3. The "O. K." tube is simpler in construction, easier and quicker to repair, and, in the presence of two or more similar noises, has a slight advantage due to the three-scale scheme.

4. In tests up to the present time the range of the C–1 eels is superior to that of the "O. K." tube.

A definite decision of the best all-round instrument is difficult to make, as each has its advantages, and a decision would depend upon the relative importance attached to each advantage.

Both the "O. K." tube and the C–1 eels will, therefore, be manufactured and put into active service. From the practical data thus obtained future decisions will be made.

DETECTION OF SUBMARINES BY MEANS OF STRAY CURRENTS.

Source: United States Naval Experimental Station, New London, Conn.

November 1918.

(10794 A–B U–4–a.)

Study in experiments along the line of the detection of a submerged submarine by means of the stray currents, due to electrolysis, have been and are still in progress at the United States Naval Experimental Station, New London, Conn.

A number of questions have arisen as the work has progressed. These concern:

(1) The type of electrode.
(2) The galvanometer.
(3) The use of trailed electrodes, or electrodes one or both of which are attached to the hull.
(4) In the case of an iron ship, the use of the hull itself as an electrode.
(5) The elimination of disturbing effects.

These questions have not all as yet been satisfactorily decided.

On three occasions a submarine has been detected at 90 ft. depth, two electrodes trailed 100 and 250 ft., respectively, astern of a

chaser being used, with a sensitive suspension galvanometer. In passing directly over the submarine, the needle in all cases struck the peg at the end of the scale, first on one side, then on the other. This seems to be the typical signal. When on a straight course, the accidental fluctuations of the needle amount to 3 or 4 scale divisions.

Trials were made, using the steel hull of the U. S. S. *Narada* as one electrode, the other being an electrode trailed 100 ft. astern. The results of this test were very promising.

A test was made in rough weather on the *G–2*, submerged to 106 ft. (measured to keel). The test was made with fore and aft hull electrodes. The variations in the zero line of the graph, due to change of course, were very apparent, as well as the fluctuations due to yawing, roll, and pitch. In spite of all these disturbances, however, the submarine indication was, in most cases, unmistakable. A double test was run on this occasion, first with bow electrode only and an electrode trailed 100 ft. astern, and, secondly, with two hull electrodes only. In the latter case, the galvanometer used was approximately twice as sensitive as the one used with the trailed electrode on the hull. The hull electrodes made the better showing.

Another test was made on the submarine *G–2* with three hull electrodes. The sea was quiet. The depth of submersion varied from 72 to 90 ft. on this test. The elimination of disturbance due to change of course was very noticeable, but clear and satisfactory indications have been obtained at a distance of 60 yards straight line to center of submarine when parallel to the length of the submarine. The indications were smaller when passing at right angles to the direction of a submarine.

Electrodes have been placed on the hull and the stern of the U. S. S. *Narada*, but tests have not been obtained.

It has been found necessary in all these tests to operate at least 2 miles from any shore containing trolley lines or power circuits, the ground currents being picked up from the sea by the electrodes, thereby causing wild fluctuations of the galvanometer needle.

USE OF RADIO DIRECTION FINDER.

Source: Confidential Bulletin No. 216, United States Naval Forces in European Waters.

2 October 1918.

(10355–A F–6–h.)

U. S. S. *Cummings* reported using her radio direction finder to locate a convoy. Contact was to be made before dark. Visibility was low. Radio bearing was taken; course changed accordingly, and after

running 7 miles the destroyer made contact. The convoy was considerably out of position, not steering the course previously given. Without the direction finder contact would probably have been lost.

AVIATION.

FLIGHT OF ITALIAN DIRIGIBLE "F–5."

Source: Italian. **5 November 1918.**

(11012 A–1–Z.)

The following account of a flight of the Italian dirigible *F–5* made on the night of 5 November 1918, for supplying food to Italian troops then operating on the left bank of the Tagliamento, is thought to be of peculiar interest on account of the mission and the skill shown in salving the damaged dirigible. Commander Maxfield, U. S. N., took part in this flight.

On the morning of 5 November 1918, the *F–5* received orders to transport the largest possible quantity of reserve food stores to the left bank of the Tagliamento for troops operating in the zone of Latisana. Maj. Pricolo intended to send an officer ahead to the spot in order to prepare for the landing of the dirigible, to avoid breaking the cases of food and to save gas for such future voyages as might be required, but owing to the urgency of the mission, it was decided to drop the reserve food from the air on a predetermined zone. Four thousand kilos of food were carried.

The maneuver of getting out of the hangar was very laborious, due to a cross wind of more than 4 meters per second. Navigation was carried out entirely at low altitude in order to avoid the strong contrary wind; at 5.30 p. m., after dark had fallen, Latisana was reached, and at a height of from 50 to 80 meters the first cases were dropped. Three successive passages at low altitude and reduced power were necessary in order to drop all the cases. When the last cases were dropped, the dirigible was at 150 meters, in static equilibrium, with motors giving their normal cruising power.

A few minutes after the return voyage had been commenced, a sharp hiss of an enormous rupture was heard. The outer bag, torn away on the left side, covered the nacelle and was twisted up in the propeller blades. The motors were immediately stopped and preparations made for landing.

With slight valving, the dirigible began to descend and touched ground in a cornfield, remaining as though nailed there. This was at 6.30 p. m. An examination with flash lights of the damage showed

that the outside bag on the left side was torn for a distance of 20 meters in length and more than 10 inches in height, leaving the beams, the inside gas bag, and all the ropes and piping uncovered. The dirigible appeared as though it were disemboweled; the planes and the bow seemed to be intact; the nacelle, having hit against branches of trees in the central part, had the floor broken in; some of the tubing of motor No. 2, the muffler, and the exhaust pipes were twisted and broken.

With the help of 8 or 10 soldiers, who were gathered with the greatest difficulty on account of being exhausted by five or six days' marching, with little sleep, the dirigible was transported to a small cleared field in the neighborhood. The bow and stern maneuvering ropes were tied to trees. Due to absolute calm, the dirigible remained motionless, although not pointed in the proper direction.

In view of the severe damage received, the possibility of continuing to navigate in any way whatever was abandoned, and it was decided to wait for dawn in order to carry out deflation and disassembly. Meanwhile, a wireless was sent to Campalto and a courier to Casarsa for men and means of help, but, due to the great difficulty of communication, there was small hope that they would arrive before the next morning. After examining the favorable condition of the wind, it was decided to make a static navigation at dawn, if only in order to cross the right bank of the Tagliamento, so as to approach the centers of supply, men, and material. Seeing that such flight would require a strong ballast, motor No. 2 and the blades of the right propeller were dismounted, as they would not have been able to turn among the torn bits of fabric. The edges of the outer bag, torn and hanging, were cut and folded. Several times the dirigible was caught in light blasts of air currents, and the entire personnel was compelled to turn to the hawsers; the few soldiers who had been collected had almost all disappeared. The whole night was spent in this manner.

At the first streak of dawn, other adjustments were made, especially to the nacelle; the damage to the bag appeared more and more impressive. Meanwhile it began to rain very hard. A strong wind struck the dirigible on the side, bending it into enormous folds and making it impossible to keep it moored any longer.

As a last desperate means of saving the ship it was decided to attempt navigation at reduced power with the only available motor in order to land. At 6.45, the dirigible reascended with four hours of gasoline in tanks, two in cans, and 25 bags of ballast.

The wind was decidedly favorable for returning to the shed. Slow speed ahead was signaled, and to the astonishment of all, it was noted that the dirigible evidenced slight directional control; for the time being no serious trouble appeared. The fabric aft of the moving

propeller flapped violently; it seemed as if it would tear from one moment to another. It was necessary to bend back completely the duck pat holding up the fabric over the propeller blades, which were just missing the bag.

As the horizontal rudder did not work at all, it was necessary to maneuver statically, using up gas and ballast, thus limiting the hours of navigation.

The speed was timed with a stop watch; it was about 45 kilometers an hour. The railroad line of S. Dona was followed at an altitude of from 60 to 100 meters.

Near S. Stino, the dirigible entered into a very dense cloud obscuring the plain. The earth could no longer be seen, even from an altitude of 50 meters. After an hour and a half of the most difficult navigation, accomplished entirely by compass, in absolute ignorance of the places passed over, it was estimated that the dirigible was in the neighborhood of the shed. As only two bags of ballast were left, it was decided to land; but at 30 meters from the earth it was learned that the dirigible was over flooded fields full of trees. A landing in such a locality, with a strong ground wind, would have entailed the certain destruction of the ship. It was thought this might be avoided by continuing to navigate at least until some open ground could be reached. By dropping the two remaining bags of ballast, the dirigible rose again, navigating at very low altitude. But it was impossible to recognize any features of the locality.

After some minutes the dirigible began to descend, notwithstanding the useless action of the dynamic planes. As there was no more ballast, it was necessary to land. A few meters underneath, however, some houses were unexpectedly noticed. It would seem that the planes must surely crash against the roof and the ridges. The dirigible passed between chimneys. The last can of oil was thrown out, which fell in a courtyard, but the descent, although very slow, continued. A catastrophe now seemed inevitable, when the motor was given full speed ahead. With the increased dynamic thrust, the dirigible rose again; the nacelle reached an altitude of 25 meters from the ground.

The increased dynamic action of the plane made possible the continuation of navigation even without ballast; but, on the other hand, the greater amount of power generated increased the possibility of rupturing the stiffening of the ship, of tearing the bag, or breaking the shaft of the fan of the motor, which was already cracked near the attachment of the front stay.

Navigation was continued in search of the station and of the railroad track of Mestre, and finally after a half hour's search it was

recognized by means of chimneys which stuck up through the stratum of clouds. Then the railroad track between Mestre and S. Giuliano appeared, and later the Oselin Canal was followed. Although navigating at 40 meters, from time to time visibility of the earth was lost. The speed had now been greatly reduced; 40 minutes were required to cover the distance between Mestre and Campalto (about 7 kilometers). By continuously following the Oselin, the shed was successfully passed. As the hangar was seen only 50 meters away, the dirigible was turned toward the field, making a sharp swing to avoid it. At 10.20 a. m., the guide rope was thrown out; only 20 kilograms remained on board in the tanks.

In his report, Maj. Pricolo highly commended the work of the whole crew, including that of Capt. Maxfield, U. S. N., who, he said, did not hesitate to render his personal aid even in the most humble tasks.

"SPANNIKER" ZEPPELINS.

27 August 1918.

(9679–C F–6–h.)

Since 1915, Germany had built 35 small airships of a new type, called "Spanniker" or Spawn Whale Fish. They are very small, only 165 to 200 ft. long, and have tails like a whale fish, and one propeller. They have a crew of three men—one pilot and two men, each handling a machine gun, one of which is situated on top of the gas bag and the other between the gas bag and the gondola. Alban motors are used.

At the time of the signing of the armistice, about 200 Spanniker zeppelins were building in the Kaiserliche Werft in Kiel.

SMOKE BOMBS ON SEAPLANES.

Source: Weekly Report 73, Naval Aviation.

30 December 1918.

On 23 December three smoke bombs were tested, and it was found that they are dangerous to carry on seaplanes. One of them, instead of firing out of the end, as it should, blew all to pieces and would have been destructive to the plane had it been attached.

KITE BALLOONS—BRITISH.

23 December 1918.

(10421 A-1-K.)

The standard naval "M" type balloons were until recently fitted with three rips, the main one in panel 9 and two smaller ones in panels 20 and 22, respectively. The two latter are called "Brewer's rips" and their object is twofold. The rip in panel 20 is intended to bring the balloon down quickly in the event of a breakaway from land, and that in panel 22 is designed to enable a long free run to be made after a breakaway if desired. These two rips were eliminated a short time ago to ease production, and on account of extra weight involved the diaphragm referred to below.

In conjunction with these rips a diaphragm was fitted between panels 18 and 19, which extended as far as the top of the ballonet when inflated. The object of this diaphragm was to prevent the gas from passing aft of this panel. It was found, however, that this diaphragm advertently affected the maintenance of form in high-wind speeds, and a series of experiments were therefore carried out to ascertain whether the rips might be operated with safety even without the diaphragm.

A balloon was released from the cable at 100 ft. with two passengers and ballast. Immediately after the release, the rip in panel 20 was pulled, and after rising about 700 feet, the balloon commenced to descend and landed safely within half a mile of the place of ascent.

Another trial was carried out to test the aft rip. The balloon was released from the cable at 300 feet, having a lift of 504 pounds with two passengers weighing together 320 pounds, and 12 bags of ballast (30 pounds each.) It rose rapidly to 1,000 feet, at which height the equilibrium was obtained. A free run was made of 12 miles in 1 hour 5 minutes, and the balloon was safely landed without being damaged.

The maximum height was 2,400 feet. The trip might have been continued, but it was not considered necessary to do so.

Immediately after the break away, the balloon assumed nearly a perpendicular position, all the weight of the car being taken by the forward car suspension. The rudder scoop was parallel with the car and about 3 feet from it. As the run continued the gas was lost, the basket gradually swung closer to the rudder, and 45 minutes after the start the rudder was blanketing the stern of the basket.

The result of these experiments proves that the diaphragm is not necessary, thus eliminating the chief objection of this system, and the rip in panel 22 will accordingly be reinstated.

FLIGHT OF U. S. DIRIGIBLE "A–236."

Source: Office of Naval Operations.

31 December 1918.

On 24 December 1918, Ensign T. E. Matham and Chief Carpenter's Mate J. H. Collier ascended in dirigible *A–236* for the purpose of establishing endurance and distance records. Dirigible *A–236* is a nonrigid ship corresponding in general features to the English *Zero* type. Full patrol equipment was carried, consisting of 196 gallons of gasoline, extra oil and water, radio apparatus, auxiliary motor, sea anchor, flashlight and Very pistols, rations, and all other necessary accessories. The proposed trip involved legs from Key West to Tampa, Tampa to Cape Sable, Cape Sable to Palm Beach, and Palm Beach to Key West.

The ship left the field at 3.12 p. m. with a south wind blowing. Cape Romano was sighted at 7.10 p. m. and extensive rain areas encountered when passing between Sanibel Island and Fort Myers. Traveling several miles through the rain to Charlotte Harbor Channel Light without sighting any break in the sky ahead, the ship turned back toward Cape Romano and the completion of the first leg was abandoned.

Cape Romano was passed at 10.30 p. m. and the rain area cleared at 10.45 p. m. Cape Sable was reached at 2.20 on Christmas Day, and steering a course along the coast, the dirigible passed Miami at 4.10 a. m. Palm Beach was reached at 6.30 a. m. At that time, the ship being considerably light, 200 pounds of water ballast were taken aboard by means of a line and specially constructed bucket; 5,000 cubic feet of gas were also valved.

After flying an hour over Palm Beach, a message reporting the progress of the flight was dropped, and the ship headed toward Miami. Three hours were spent in exhibition flying at Miami, and 60 pounds of water ballast taken aboard. Leaving Miami at 2 p. m. the dirigible headed down the coast to Alligator Light, reporting there at 5.50 p. m. Marquesas Key was reached at 9.45 p. m. and Key West at 10.15. The remainder of the time was spent in the environs of Key West, flying at regular cruising speed. During the entire second night the sky was heavily overcast with rain clouds, and a north wind, ranging from 20 to 36 miles, was blowing. At 5 a. m. of the 26th, 3,225 cubic feet of gas were valved, and 160 pounds of water ballast were taken aboard. A landing was made at 3 a. m. The motor was run continuously at an average speed of 950 r. p. m., being stopped only twice, three minutes each time, to put extra oil in the motor. Twenty-four gallons of gasoline remained at the end of the flight. Altitudes reaching 2,000 ft. were maintained.

In straight courses a distance of 691 miles was covered. Including four hours of exhibition flying at Palm Beach and Miami, and nine hours of flight at cruising speed in the vicinity of Key West, 150 to 200 miles additional must have been covered. The duration of the flight was 40 hours and 48 minutes.

It is believed by this station that the distance covered in straight courses establishes a new record in this country for any type of air craft, and a new world's record made by this type of dirigible for time spent in continuous flight. This time record surpasses that made by the same ship on 23–25 November by 8 hours and 48 minutes.

ENGINEERING.

TURBINE BLADING.

Source: British.

7 November 1918.

(10305 U–3–c.)

The following instructions, which have been issued to all British engineer overseers, are reprinted as being of interest to engineer officers:

1. The number of blading defects in turbines of newly completed vessels on service makes it again necessary to emphasize the necessity for scrupulous care and attention to detail at the building stage. It is to be observed that the blading of the high-speed turbines now in use is in many cases highly stressed under working conditions, and, although ample margin is provided (having in view the strength of the material), this margin may be absorbed by any deviation from design or carelessness in the work of machining or assembling of the blading in the shop, and results in time in the failure of one or more blades and possibly the stripping of the turbine.

2. The utmost attention is therefore to continue to be given to the blading in all its detailed stages.

3. Keeping in view the fact that unskilled labor is employed at some stages, it is incumbent on you to see that, in machining operations for example, the speed of the operation or the possible inefficiency of the tool is not such as to unduly heat the blade at any part, and that in such operations as reducing the root section, the radii provided for in the design and a reasonably fair contour of the section without sharp corners or abrupt discontinuity in the change of form of the section are secured.

4. Further, it should be seen that the blades and particularly their root sections are not punished or damaged in assembling.

5. *In short, speed of operation must be regarded as entirely a secondary consideration to reliability and efficiency.*

6. Scrupulous precautions are further to be taken to insure that the shrouding is made and fitted as designed, that adequate countersink (where so designed) and riveting surplus are maintained, and that the designed clearance space between successive shroud gaps is provided in form and dimensions exactly as shown on the drawings.

7. The utmost possible supervision should be given to the work at the actual blading stage, not only to secure agreement with the design in respect to the close fitting of blade and distance pieces, but to insure that there is no possibility of faulty blades being used or that blades are not damaged when driving up, observing that any defects so occasioned can not subsequently be detected.

8. No hesitation need be shown in rejecting any blading material which for any reason, whether on the grounds of maltreatment, overheating, nonagreement with design or other defects, may be considered open to suspicion.

9. Strict attention should be paid when the turbines are steamed in the shop that the specified speed plus the margin provided in the specification for balancing is on no account exceeded.

10. With these precautions specially in view, it is considered desirable that if possible all work on the blading, and more particularly the actual blading operation, should be under the continuous supervision of one of your staff, and you are to report on the practicability of this course or offer any other suggestions which it is considered will give effect to rigorous compliance with these and previous instructions on this matter.

If possible, and provided that in the present circumstances no delay whatever is incurred thereby, it is preferred that the blading of turbines be carried out entirely in working hours.

11. Such of these instructions as concern them may be brought to the notice of the contractors in the usual manner.

AIRPLANE CARRIERS — BRITISH — REGULATIONS REGARDING GASOLINE AND KEROSENE STORES.

Source: British.

1 December 1918.

(10305–O U–3–c.)

The following regulations on care of gasoline and kerosene stores were issued by the British Admiralty to aircraft carriers:

(i) The following spaces should be considered as danger spaces: Hangar, dope room, and store; gasoline, oil, and kerosene stores; engineer's and carpenter's workshops; any space or compartment opening out from the above below a height of 6 feet.

(ii) No open fires or naked lights of any description are to be allowed anywhere in the vicinity of these spaces. Safety electric lamps may be used when required in addition to the electric-light installation fitted in the ship. Electric torches are considered to be unsuitable for use in the vicinity of gasoline and kerosene and should not be used.

(iii) Matches are to be surrendered by all men going into any of the spaces mentioned in paragraph i.

(iv) In framing smoking regulations for the ship's company the commanding officer is to bear in mind the possible danger from gasoline in the danger spaces mentioned in paragraph i, special care in framing the regulations being taken accordingly. In no case should smoking be permitted in an inclosed space or nearer than 20 feet in the open when the boundary bulkhead of the danger space is fitted with doors and sidelights or other openings.

(v) Before reentering any of the above-mentioned spaces if situated below the weather deck, after they have been closed for a time, the exhaust fans are to be run for such periods as are considered necessary, and men on first entering are to be kept in observation in case of any detrimental effect of gasoline vapor. If the spaces have been closed for a long period, as an additional precaution, pending further experience, each man on first entering is to have a life line. The exhaust fans are to be kept running as far as possible during the whole of the period that the various compartments are in use, and in addition at other times to such an extent as may be considered desirable to prevent accumulation of gasoline vapor, etc. The exhaust fans should be regularly run for a period of 15 minutes each watch, and the time of starting and stopping the fan should be recorded in the log. In the case of the hangar, ventilating arrangements, such as doors, scuttles, shutters, etc., are to be kept open as much as possible and in such a manner that a good current of air is passing continually through the hangar.

(vi) The gasoline and kerosene stores are to be regarded as specially dangerous places for men to enter, and the precautions are at all times to be fully taken in entering these spaces. No person is to be allowed to enter these storerooms on any pretense whatever without the express authority and the presence of a responsible officer or petty officer. If the deck of the gasoline store is of steel, all persons entering the store must wear felt or rubber soled boots.

(vii) The utmost care is to be exercised to insure that both empty and full gasoline and kerosene cans and barrels are always kept with their stoppers screwed home and with the stoppers or bungs turned upward. A spill fitted with safety device should always be used when pumping gasoline and kerosene from barrels.

(viii) It must be remembered that gasoline vapor has a very remarkable property of creeping into spaces adjacent to those in which the gasoline vapor arises and may ultimately find its way to unexpected positions beyond the limits of hangar, workshop, and storerooms. The air in these compartments is to be tested with the Philip & Steele inflammable vapor detector, if fitted, at least twice daily. In cases where inflammable vapor is detected, the strictest precautions are to be taken to prevent its ignition by light or sparks, etc., and immediate steps are to be taken to remove the foul air by means of the ventilation provided. Officers and men should be on the alert to bring to notice immediately any suspicion of accumulation of gasoline vapor in other parts of the ship. The commanding officer will then take steps such as he considers necessary for safety and for the removal of the cause of danger.

(ix) The usual precautions are to be followed, including hoisting of approved danger signals when embarking or disembarking gasoline.

(x) The keys of the gasoline store are to be treated in a similar maner to magazine keys and the keys kept on the magazine keyboard.

(xi) Inflammable dope and acetone are to be treated similarly to gasoline and are to be kept in the gasoline store.

(xii) Where a steam drench is fitted to the gasoline store, a responsible person is to be detailed for the turning on of the drench should it be necessary in the event of fire or action. The steam drench stop valve is to be fitted with a padlock, and the keys for the padlock are to be treated in all respects similarly to flooding keys.

(xiii) Attention is called to the use of a mixture of sawdust and bicarbonate of soda for extinguishing small fires occasioned by the ignition of gasoline and other inflammable liquids.

CONSTRUCTION AND REPAIR.

PHOTOGRAPHS TO BE TAKEN OF DAMAGE SUSTAINED BY BRITISH WARSHIPS AND MERCHANT SHIPS.

Source: British.

1 December 1918.

(10262 I U–3–C.)

The British have issued orders that in all cases of ships damaged in action being taken in hand for repairs, the superintendent or the senior naval officer of the dockyard or district concerned should arrange for the damage to be photographed and for the negatives to be forwarded to the Admiralty (Dockyard Department) as early as possible.

2. In case of–

(*a*) damage to British warships and merchant ships, caused by mines or torpedoes;

(*b*) damage to British warships caused by collision with private vessels; and

(*c*) other damage of exceptional interest,

photographs should be taken and forwarded to the Admiralty, but photographs of minor accidents and damage are not required. All photographs forwarded in compliance with the instructions contained in this paragraph shoul be accompanied by reports of the damage, including a statement as to the condition of loading of the ship, and whether the ship was mined or topedoed.

3. The commanding officers are to forward, in addition to any photographs which may be submitted, reports accompanied by diagrams showing the following details in regard to the more important shell hits, viz:

(*a*) Point of first impact.

(*b*) Thickness of plate, angle at which struck, and path of shell.

(*c*) Subsequent plates passed through by the projectile before bursting.

(*d*) Point of burst.

(*e*) A few of the more important results, and paths of large fragments.

NOTES ON BATTLESHIP DIVISION NINE.

BATTLESHIP DIVISION NINE.

Source: War Diary Battleship Division Nine—Rear Admiral Rodman.

30 November 1918.

SHIP AND FIRE CONTROL STATIONS.

It has been understood that consideration is being given to the plan of erecting the cage mast on top of the conning tower in the new battle cruisers. It is believed that, if this were done, it would be a fatal error, for a number of reasons:

(*a*) At least two deck *ship*-control stations are necessary.

(1) An *Auxiliary Station* outside of the conning tower with good visibility for use in entering and leaving port, in thick weather and at night, and preliminary to the time when the approach is started for action. It should be installed on the bridge or in the foremast.

(2) *Battle-Control Station* or conning tower.

(*b*) These two stations should not be on the same erection for no other reason than that a shot which might destroy and put the conning tower out of commission would wreck the mast and *leave no deck station* available for handling ship, to say nothing of the interference to fire and ship control if the mast alone were wrecked and fell on and about the conning tower.

I am assuming that the *Auxiliary Station* will be in the cage mast.

(*c*) One of the most important and essential requisites of a ship or fire control station is an unobstructed all-around view; in the latter case from one and the same set of instruments. Hence, if a cage mast were erected *on top* of the conning tower, the elements would interfere with a centrally located set of visual instruments, necessitating the installation of two sets, one on each side, and a change from one to the other as the target shifted across bow or stern, a very serious handicap.

(*d*) The sooner we abandon the idea that a ship can be controlled and handled from a station where there is no steering wheel, compass, engine telegraphs, etc., the better.

It should only be as a last resort that we shift control to central and direct from deck by voice tube or telephone. I would much prefer to shift from conning tower to the *Auxiliary Station* on the bridge or mast, if the conning tower were destroyed, and take chances, rather than try to control from *Battle Two* through *Central.*

(*e*) It should be emphasized most emphatically that there is not enough attention and forethought being given to the necessity and facilities for *ship* control under battle and cruising conditions, though *fire* control progresses and reaches a high standard of efficiency. Ship control is not only equally as important, but, lacking the former, the latter would be useless.

(*f*) *Battle Two Station*, in wake of the forward high turret in the *old ships*, is absolutely unsuitable for the reasons that—

(1) Under varying conditions of wind and sea, from its exposed and unprotected (weather and sea) position, it would often be untenable.

(2) No extended all-around view, a very necessary requisite.

(3) Absence of ship-control instrument, such as wheel, compass, and engine telegraphs.

(4) Poorly improvised connections and communications to *Central.*

(*g*) In the new ships, in Battle Two Station, in the booth in the high turret, some of the former objections are removed, but the absence of the ship-control instrument here is a decided objection.

Could a compass, wheel, and engine-room telegraphs be added, it would be a decided improvement.

Recommendations.

(*a*) That no matter what the structural difficulties may be, the foremast be an entirely separate erection from and free of the conning tower.

(*b*) That the policy hereinbefore mentioned, be carried out.

Conclusion.

(*a*) Ships are built primarily to carry guns; sacrifices of either characteristics should be made to insure a simple and effective fire control.

(*b*) Ship control is equally as important and deserves the same consideration; *it is impractical to have an efficient fire control unless there be an efficient ship control.*

ALTERATIONS TO TEXAS.

The *Texas* completed her docking period at Newcastle on Monday, 4 November, and arrived here Tuesday, 5 November.

Her old navigation bridge has been removed, and a new one built, which extends out over, but well clear of the conning tower; it is glass inclosed and has the necessary ship-control instruments at hand. The range finder, formerly on No. 2 turret, will be mounted on top of the new bridge. These improvements are very satisfactory.

Airplane Installation.

The above-mentioned changes were made necessary not only for battleship and fire control, but in conjunction with the platform or runways, for the forward airplane, which was also added.

RADIO TELEPHONE INSTALLATION.

The following is the radio-telephone situation to date:

(*a*) One phone is installed on each of the following: *New York*, *Texas*, *Wyoming*, *Arkansas*, and *Florida*.

(*b*) One phone installed on Fleet Flagship.

(*c*) One phone installed on leader of destroyer screen.

(*d*) In ships of the Sixth Battle Squadron the phones have been installed below decks in conning tower support pockets, and an extension run to the bridge. This extension consists of a transmitter, telephones, and a loud speaker. The extension telephones are used for a continuous watch. The loud speaker is cut in when it is wished to speak direct from one bridge to the other; its use relieves the captain or officer of the deck from having to put on the telephone.

(*e*) The storage batteries which form the source of power for the phones have not arrived. A makeshift arrangement whereby the I. C. voltage is bolstered up by two 10-volt storage batteries in parallel is being used, but this is unsatisfactory. I. C. noises and sudden drops in voltage make this arrangement unreliable.

88200—19——7

(*f*) Experiments with the telephones have shown the following points:

(1) When connected to an aerial of the size for which the set is designed, the telephones give perfect transmission of speech, and have been heard a distance of 100 miles; but they interfere with the other sets on board ship, and are interfered with by the other sets aboard ship.

(2) Experiments have been conducted with a view to seeing whether range and interference could be reduced by decreasing power and using a small antenna. These experiments have so far been unsuccessful. When the power was reduced a point was soon reached where the set failed to function entirely. The same thing was experienced when the aerial was reduced. In other words, the set is designed to work on a certain sized aerial at a certain power, and efforts to change these fundamental points have so far been unsuccessful.

(*g*) In view of the above an interphone extension system or other extension leads, are not recommended at the present time.

PREPAREDNESS, MAINTENANCE, AND UPKEEP.

After a full year away from home, on active war service with not a single week passing without being under way, under constant employment, with no extensive overhaul periods nor opportunity to make major repairs; after having been under constant four hours' notice, often much less, for steam to make full speed, the ships of this division are in far better condition *in every way* than they were when they left home.

It is a great tribute to the spirit of the officers and men who have accomplished this and who have been more than willing to give their best endeavor at all times to accomplish these results.

There is no question as to the high estimation in which this force is held by all who know it, and that it is now, and has been, in the highest degree of readiness and efficiency during the service with the Grand Fleet.

While minor repairs and docking for some ships are necessary, and alterations and new installations are desirable on all, the division is, nevertheless, absolutely ready for any service—distant, prolonged, or otherwise—which it might be called upon to perform.

○

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MONTHLY INFORMATION BULLETIN

15 FEBRUARY 1919

WASHINGTON
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1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 February 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

GEO. W. WILLIAMS,
Captain, United States Navy,
Acting Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

MONTHLY INFORMATION BULLETIN.

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DISCHARGE OF TORPEDOES FROM SEAPLANES.





OPERATIONS.

ANALYSIS OF TORPEDO FIRING IN THE BATTLE OF JUTLAND.

(9223A, 11013, 11066.)

TORPEDOES FIRED AT THE ENEMY IN THE BATTLE OF JUTLAND.

An analysis and summary of all the torpedoes fired by British ships and vessels follow:

"Probability" figures based on peace practices are given as a comparison, principally as an indication of the relative ease or difficulty of the different shots. These chances, of course, take no account of bad runs or successful avoidance of torpedoes. The higher figure given in some cases is that for a line of big ships 2½ cables apart; the lower figure that for a single ship shot. It is interesting to note that the number of hits claimed corresponds very closely with the "probability" for single ship shots.

The estimate of actual hits is based on information available, necessarily by no means reliable. A comparison of the reports from British individual ships would give about 18 hits instead of the 13 given in the list below. In the latter number no account is taken of the possibility that more than one hit may have been made on the same ship; there is, however, no confirmation that more than one hit was obtained on any ship. The estimated number of actual hits is therefore considered to be, if anything, on the low side.

SUMMARY OF RESULTS.

	Torpedoes fired.	Hits claimed.	"Probability."	Actual hits.		Percentage of certain and probable.
				Certain and probable.	Possible.	
Day	46	9	9 to 17	4	2	8.7
Night	39	18 to 20	20	7	(?)	18.0
Total	85	27 to 29	29 to 37	11	2	13.0

Some of the other claims may ultimately be upheld, but there is at present no evidence that further hits were obtained except from British reports; in some cases two or more hits may have been obtained on one ship, which in this summary are counted as one only.

Approximate Allocation of Hits.

Owing to conflicting reports as to the times at which enemy ships, known to have been torpedoed, were actually hit, and to difficulties in obtaining reliable information as to ships torpedoed which subsequently reached harbor, it has been found impossible to allocate the hits claimed with any degree of certainty. In the cases of ships severely damaged, it is rarely possible to obtain reliable evidence as to the respective share of guns, mines, and torpedoes in the infliction of the damage.

The following four ships are definitely known to have been hit by torpedoes and to have subsequently sunk:

Battleship	*Pommern.*
Light cruisers	*Frauenlob, Wiesbaden, Rostock.*

The other German vessels sunk were:

Battle cruiser	*Lützow.*
Light cruiser	*Elbing.*
Destroyers	Five.

The *Lützow* is reported, on rather doubtful authority, to have been disabled by a torpedo about 6 p. m. and sunk by the enemy in the early morning.

The *Elbing* was severely damaged in collision with a German battleship while avoiding a torpedo, and subsequently sank.

As to the five torpedo-boat destroyers, there is no definite evidence except from British reports. *Petard* claims to have torpedoed one.

It has been reported that the following seven ships, which are known to have reached harbor, were struck by torpedoes:

Battleships	*Markgraf, Rheinland, Nassau, Westfalen.*
Battle cruiser	*Von der Tann.*
Light cruisers	*München, Stettin.*

It is thought that in several instances the names of these ships may have been wrongly given, as other evidence indicates that the periods during which certain of the ships named were under repair were considerably shorter than one would expect in the case of a ship seriously damaged below the water line.

It is, however, considered likely that, although the names of the ships may have been given erroneously, the number of ships in each class damaged by torpedoes is approximately correct.

In addition, the battleship *Ostfriesland* is known to have received extensive underwater damage, but this is believed to have been due to a mine.

Ships Sunk by Torpedoes.

Pommern.—This ship was torpedoed during the night and sank instantly. It is reported to have been struck in the magazine. There were no survivors. Evidence points to this ship having been sunk

by the Fourth Flotilla about 11.30 p. m. The enemy attacked by the Fourth Flotilla between 11.10 p.m. and 12.25 a.m. appears to have consisted of a battle squadron of *Deutschland*-type battleships, preceded by light cruisers, and it is uncertain from many other reports whether the ship fired at was a light cruiser or a battleship. Eleven torpedoes were apparently fired at the cruisers between 11.10 and 11.43 p. m. Four hits are claimed, another doubtful. *München* and *Stettin* were probably torpedoed in this attack.

Five torpedoes apparently were fired at the battleships between 11.30 p. m. and 12.30 a. m. Three hits and one probable hit are claimed. *Faulknor* reported three torpedo explosions about 11.30 p. m. *Pommern* was in all probability sunk in this attack.

Wiesbaden.—After being disabled by gunfire, this ship was torpedoed either by *Onslow* at 6.15 or *Falmouth* at 6.21. Both fired at a disabled light cruiser with three funnels. *Onslow* reported a hit under the fore conning tower. The range in each case was about 4,000 yards. *Wiesbaden* did not sink until the next morning. The sole survivor, who remained on board until she sank, reports only one hit by a torpedo.

Rostock.—This ship was torpedoed by a torpedo boat destroyer at about 6.30 p. m. She was, therefore, the vessel claimed by *Shark*, who hit a light cruiser with four funnels at 6 p. m. with a torpedo. The cruiser appeared to catch fire. *Rostock* remained afloat until the following morning, when she was apparently blown up by her own crew, who were taken off by German destroyers.

Frauenlob.—The evidence available points to this ship having been torpedoed by *Southampton*, who fired one torpedo at a group of searchlights at 10.21 p. m. *Frauenlob* was hit, and sank rapidly after being torpedoed. There were only about eight survivors, who were picked up by Dutch fishing craft.

Lützow.—This ship is reported by a deserter to have been hit by a torpedo at 6 p. m. just abaft the foremast. She became totally disabled and was sunk by the enemy next morning. Other statements made by the deserter were so imaginative that this hit can only be as a "possible." The position of the hit given in his statement is, however, corroborated by *Falmouth*, who claims to have hit the leading battle cruiser, *Lützow*, at 6.55 just abaft foremast. On the other hand, *Yarmouth* fired a torpedo at the leading ship of the German battle cruisers at 6.30 and Admiral Beatty from the *Lion* reports this ship leaving the line of battle at 6.36. *Lützow* may have been sunk by gunfire.

Ships Reported Hit by Torpedoes.

Markgraf.—There is no evidence at all as to when this vessel was torpedoed.

Rheinland, Nassau, Westfalen.—It appears possible that these ships were torpedoed by the Twelfth Flotilla, which attacked a squadron

of four dreadnaught battleships about 2 a. m. The enemy appears to have consisted of four two-funneled ships, class uncertain. Seven torpedoes were fired at a range of about 3,000 yards and eight hits are claimed, on the second, third, and fourth ships of the line. The second ship appeared to blow up, but this has not been confirmed.

Actual hits appear to have been as follows:

Second ship.—At least one hit, perhaps more; two under bridge, one abreast mainmast. Appeared to blow up.

Third ship.—One between funnels.

Fourth ship.—One amidships.

These vessels were probably *Rheinland, Nassau, and Westfalen.* All returned to harbor.

Von Der Tann.—The reported damage to this ship could have been caused during the torpedo attack on the German battle cruisers at 4.15 p. m., but there is considerable doubt as to whether this ship was actually torpedoed. This hit is, therefore, only counted as "possible."

München and *Stettin.*—It appears possible that these ships were struck at the same time as *Pommern*, as this type of light cruiser would be likely to accompany vessels of the *Pommern* class. At 11.55 *Broke* fired a torpedo at a cruiser with three funnels and reported a hit amidships. At 11.30 *Garland* likewise claimed a hit abreast mainmast on a light cruiser with three funnels. As the range in each case was only 8,000 yards, it is probable that the light cruisers were *München* and *Stettin.*

Ostfriesland.—There is no evidence as to when this ship was damaged, except that it was in the early morning. The damage was almost certainly from a mine, and this has not been counted as a hit.

SUMMARY OF HITS OBTAINED.

	Certain or probable.	Possible.
(1) Caused ship to sink:		
Pommern	1	
Frauenlob	1	
One destroyer	1	
(2) Instrumental in sinking:		
Lutzow		1
Weisbaden	1	
Rostock	1	
(3) Caused damage but did not sink:		
Markgraf	1	
Rheinland	1	
Nassau	1	
Westfalen	1	
Von Der Tann		1
München	1	
Stettin	1	
Total	11	2

It is also possible that some of the above ships may have been hit by more than one torpedo, especially during the frequent attacks made during the night by the torpedo boat destroyer flotillas.

The *Elbing* was sunk in collision while avoiding a torpedo.

Four destroyers were also sunk, presumably by gunfire only.

In justice to the ships claiming hits during the various actions, it must be clearly emphasized that the above remarks are only a provisional attempt to allocate the hits, based on the scanty evidence at present available.

General Torpedo Remarks.

In most cases in the Battle of Jutland torpedoes were fired under conditions now generally recognized as the best, viz:

	Range.	Inclination of enemy.
	Yards.	*Degrees.*
Day	7,000–10,000	100 to 135
Night	800– 3,000	90 to 130

During the battle cruiser action prior to 4.40 p. m., the enemy's first scouting group were slightly abaft the beam of the British battle cruisers and well outside torpedo range. An opportunity occurred for day attack with destroyers and was effectively carried out by the Thirteenth Flotilla between 4 and 4.30 p. m. Two destroyers were put out of action after closing to 5,000 yards or less. This proved to be rather too close. After 4.40 p. m. the battle cruisers were still outside torpedo range. No opportunity occurred throughout the action for firing 18-inch torpedoes from battle cruisers.

The opening stages of the battle fleet action about 6.30 p. m. were distinctly favorable for E. R. torpedo attack as regards position and range, but the low visibility prevented a clear appreciation of the general torpedo situation being formed; the first cruiser squadron was also between the battle fleet and the enemy, while the battle cruisers were barely clear of the second battle squadron at the van. When the British ships had cleared the range, the enemy were indistinctly seen and commenced to retire under the pressure of the gunfire, and no subsequent opportunity for daylight torpedo attack occurred.

The destroyer day attacks carried out by both British and German squadrons showed that, against an enemy who is developing a rapid and effective gunfire destroyers should not approach within 7,000 yards gun range of the enemy heavy ships. If, however, enemy gunfire has been crushed or reduced in volume, the attack should be pressed home until a position of 5,000 yards from the enemy line is attained in order to insure torpedoes crossing the track should the enemy turn away. Except when firing torpedoes at single disabled ships little advantage is gained in closing to within 5,000 yards.

A noticeable feature of the torpedo records of the action is the considerable difference in the numbers of torpedoes fired by ships in the same squadron and for whom the torpedo situation at a particular moment was presumably very similar. In one squadron seven torpedoes were fired by one ship, one by another, and none by a third. It is of very great importance, when the conditions admit, that torpedo fire should be opened by a maximum number of ships possible at the earliest moment, always allowing a reasonable margin for range and for torpedo and sighting errors. Further, a steady rate of fire should be kept up. Success in a "browning" attack must depend upon the number of torpedoes which can be thrown across the enemy's line.

The action emphasized the importance which attaches to efficient lookouts being stationed to give warning of the approach of torpedoes, enabling immediate steps either by a turn toward or away to be taken to avoid them. The selected lookouts must be highly trained and able to pick up the tracks of torpedoes under unfavorable conditions.

The torpedo actions during the battle emphasized the importance of a torpedo-control officer being stationed in light cruisers and destroyers to assist the captain during the attack. In destroyers it may be necessary that such officer should be also a gun-control officer. He should be available for controlling either the gun or torpedo armament, according to whether the gun or torpedo situation is at the particular moment considered of paramount importance.

TORPEDOES FIRED AT THE ENEMY DURING THE BATTLE OF JUTLAND BANK, 31 MAY 1916.

DAY ACTION.

I.—Torpedo Attacks on German Battle Cruisers, 4.15 to 5.15 p. m.

This attack was commenced at 4.15 p. m. by 12 torpedo-boat destroyers against five battle cruisers, then steering southeast. The attack was broken up by an action with a German flotilla of 1 light cruiser and 15 torpedo-boat destroyers. Although the Germans were driven back, only 5 torpedoes out of the 48 carried by the attacking torpedo-boat destroyers could be fired across the line of the battle cruisers before they turned at 4.52 p. m. to northwest.

Five more torpedoes were fired after the turn to northwest, two by *Nerissa*, one of the attacking flotilla, and three from the British battle cruiser line, two from *Lion*, one from *Morseby*, stationed on her engaged bow.

Morseby and *Nerissa* both claimed hits on the rear ship of the line, at approximately the same time. As *Fearless* reported a battle cruiser leaving the line at 5.10 p. m., it appears probable that one hit at least was obtained. This may have been the *Von Der Tann*,

but there is considerable doubt as to whether this ship was actually torpedoed. Three torpedoes are known to have passed close to *Moltke*.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
13	2	2 to 5	Possibly 1.

II.—Attacks on German Battle Fleet, 4.40 to 5.30 p. m.

On the German Battle Fleet being sighted in the rear of their battle cruisers, they were attacked by *Nottingham* with an E. R. torpedo, at very short range by *Nestor* and *Nicator*, who had just been attacking the battle cruisers, and subsequently by *Moorsom* at a longer range.

Torpedoes fired.	Hits claimed.	"Probability."	Actual hits.
7 to 8	.....	2 to 3	No evidence.

It is possible that the *Markgraf* was hit during this attack instead of as indicated in V.

III.—Attacks on German Battle Cruisers During the Fleet Action, 6 to 7 p. m.

Five torpedoes were fired at the battle cruisers by various torpedo-boat destroyers and light cruisers during the deployment of the Grand Fleet and the turn of the Germans to the south.

Hits are claimed by *Acasta* and *Falmouth* on the leading battle cruiser, and by *Ophelia* on a battle cruiser whose position in the line is not stated. One battle cruiser is reported to have left the line at about 6.30 p. m. This was the *Lützow*, and it is counted as a "possible" hit.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
5	3	1 to 2	Possibly 1.

IV.—Torpedoes Fired at the German Battle Fleet Between 6 and 7.30 p. m.

Valiant and *Malaya* fired one torpedo each at the head of the line, *Onslow* and *Marlborough* at the *Kaiser* group; *Lion* and *Revenge*, point of aim not stated. *Lion* and *Marlborough* fired E. R. torpedoes.

No hits were seen.

Torpedoes fired.	Hits claimed.	"Probability."	Actual hits.
8	.....	1 to 3	No evidence.

It is possible that *Markgraf* was hit in this attack and not as indicated in V.

V.—Torpedoes Fired at the German Battle Fleet Just Before Dark.

Five torpedoes were fired at a group of ships apparently consisting of three *Deutschland* type, some *Kaiser* type, and three *Nassau* type. No hits were claimed by the firing ships, but an explosion was seen to take place on a large ship apparently of the *Kaiser* class at 8.40 p. m. If the times are correct, this explosion may have been caused by *Calliope's* torpedo. This ship may have been the *Markgraf*, but it is not known at what time she was torpedoed. (See above.)

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
5	.....	1 to 2.	Possibly 1.[1]

[1] This hit is counted as a "probable"; it may not have been on this occasion that Markgraf was hit.

VI.—Attacks on Detached or Disabled Ships During the Day Action.

In the destroyer action at 4.15 p. m. *Petard* fired a torpedo at a group of three or four German torpedo-boat destroyers and claims to have sunk the leader.

Lion, *Onslow*, and *Falmouth* fired among them four torpedoes at a disabled light cruiser with three funnels, probably the same one in each case. This was the *Wiesbaden*. *Lion* and *Onslow* claimed hits.

Marlborough and *Shark* fired two torpedoes at a four-funneled cruiser—the *Rostock*. *Shark* obtained a hit.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
7	4	2	Probably 3.

SUMMARY OF TORPEDOES FIRED DURING DAY ACTION.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.	
			Possible.	Probable or certain.
I. 13 (1 misfire)	2	2 to 5	1	.....
II. 7 or 8	.....	2 to 3	No evidence.	
III. 5	3	1 to 2	1	.....
IV. 8	.....	1 to 3	No evidence.	
V. 5	.....	1 to 2	.....	1
VI. 7	4	2	.....	3
Total:				
Without VI, 38 or 39	5	7 to 15	2	1
With VI, 45 or 46	9	9 to 17	2	4

Number fired by different types of ships (VI excluded):

Battle cruisers	6
Light cruisers	7
Battleships	4
Torpedo-boat destroyers	22

NIGHT ATTACKS.

I.—Attack on German Cruisers by *Castor*, *Magic*, and *Marne*, 9.50 to 10.50 p. m.

Several cruisers were seen. Four torpedoes were fired; other torpedo-boat destroyers did not fire apparently because they were blinded by the glare of *Castor's* guns or because they thought the enemy might be British ships.

Marne and *Magic* claimed hits, apparently on different ships.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
4	2	2	Possibly 1.

Ship not identifiable.

II.—Light Cruiser Attack, 10.21 p. m.

One torpedo fired by *Southampton* at a group of searchlights. Hits claimed on leading ship. "Probability" about 50 per cent. *Frauenlob* was hit, and sank rapidly.

III.—Attack by Fourth Flotilla on German Cruisers and Battleships, 11.10 to 12.25.

The enemy appears to have consisted of a battle squadron of the *Deutchland* type preceded by light cruisers, and it is uncertain from many of the reports whether the ship fired at was a light cruiser or a battleship.

Eleven torpedoes were apparently fired at the cruisers between 11.10 and 11.43 p. m. Four hits are claimed; another doubtful.

Munchen and *Stettin* were probably torpedoed in this attack.

Five torpedoes apparently were fired at the battleships between 11.30 p. m. and 12.30 a. m. Three hits and one probable hit were claimed.

Faulknor reported three torpedoes explosion at about 11.30 p. m.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
16	[1] 6	10 to 11	Probably 3.

[1] 2 doubtful.

Pommern was probably sunk in this attack.

IV.—Attacks by Twelfth Flotilla on a Squadron of Four Dreadnaught Battleships or Battle Cruisers, 2 to 2.30 a. m.

The enemy appears to have consisted of four two-funneled ships; class uncertain.

Seventeen torpedoes were fired, and eight hits were claimed, on the second, third, and fourth ships of the line. The second ship appeared to blow up, but this has not been confirmed.

Actual hits appear to be as follows:

Second ship.—At least one hit, perhaps more; two under bridge, one abreast mainmast. Appeared to blow up.

Third ship.—One between funnels.

Fourth ship.—One admidships.

These ships were probably *Rheinland*, *Nassau*, and *Westfalen*. All returned to harbor.

Torpedoes fired.	Hits claimed.	"Probability,"	Estimated actual hits.
17	8	7	Probably 3.

V.—Attack by *Moresby* on a Squadron of Four *Deutschland* Class, 2.37 a. m.

One torpedo was fired; *Moresby* claimed a hit on the third ship of the line.

Torpedoes fired.	Hits claimed.	"Probability."	Estimated actual hits.
1	1	50 per cent.	Possibly 1.

Ship not identifiable.

SUMMARY OF TORPEDOES FIRED IN NIGHT ATTACKS.

	Torpedoes fired.	Hits claimed.	"Probability,"	Estimated actual hits	Per cent.
I	4	2	2	Possibly 1[1]	
II	1	1	50%	1	
III	16	7 to 9	10 to 11	Probably 3	
IV	17	8	7	do	
V	1	1	50%	Possibly 1.[1]	
Total	39	19 to 21	20 to 21	7	18

[1] These must be classed "improbable." Ships hit not identified.

TORPEDOES FIRED BY THE ENEMY—BATTLE OF JUTLAND BANK AND THE DAY FOLLOWING.

An analysis and summary of all torpedoes reported to have been fired by the enemy at British ships and vessels during the Battle of Jutland Bank and on the day following follow:

The various attacks have been classified as follows:

I. Attack on battle cruisers by German submarines, 3.45 to 4.15 p. m.

II. Attack on Third Battle Cruiser Squadron by German light cruisers, 5.45 to 6.15 p. m.

III. Concentrated attack on First Battle Squadron, 6.45 to 7.15 p. m., apparently by two submarines.

IV. Concentrated attack on First Battle Squadron, 7.33 to 7.38 p. m., apparently by one destroyer flotilla.

V. Torpedoes fired at cruisers at head of line about 6.40 p. m.

VI. Torpedoes fired at cruisers at head of line about 7.30 p. m.

VII. Single torpedoes fired at fleet.

VIII. Individual attacks on *Champion* and torpedo-boat destroyers by German torpedo-boat destroyers.

The probability figures are based on the results of torpedo long-range firing in peace time, when alterations of course were not allowed.

SUMMARY OF RESULTS.

Torpedoes seen.	Hits.	Under.	Short.	Avoided.	Missed.	Hits (per cent).
66+(?)	2	4	2 or 3	32+(?)	25+(?)	About 2.5

The two attacks on the First Battle Squadron must be regarded as successful operations in a sense, although unfruitful.

On each occasion a large number of torpedoes were successfully fired across the track of the battle squadron. Had it not been for the good lookout kept and the successful use of helm, six or seven hits should have been obtained.

Some of the torpedoes appear to have been running badly and several appeared to be at the extreme end of their run. One at least must have passed under; four others are reported to have passed under on less definite evidence.

Of the eight torpedoes fired during the night, three ran on the surface. This was probably intentional.

SUMMARY OF GERMAN TORPEDOES WHICH MISSED THEIR AIM.

Ship.	Missed.	Missed under.	Hit.
Battle-cruiser force:			
Nicator	1		
Tiger	4		
Princess Royal		2	
Invincible	(?) 5		
Indomitable	5		
Inflexible	4	1	
Battle fleet:			
Iron Duke	2		
Marlborough	5	1	1
Revenge	3		
Hercules	3		
Agincourt	4		
Collingwood	2		
Neptune	1		
St. Vincent	3		
Barham	4		
Malaya	(?)		
Duke of Edinburgh	1		
Calliope	6		
Champion	1	1	
Shark	1		1
Unity	1		
Garland	3		
	59	5	2
Total		66	

I.—Attack on Battle Cruisers by German Submarine, 3.45 to 4.15 p. m.

The battle cruisers were steering southeastwardly, with *Lydiard* and *Landrail* on the engaged (port) bow of *Lion*, and Thirteenth Flotilla ahead.

3.30 p. m.—Torpedo fired by a submarine at *Nicator*; surface run; *Nicator* turned away at full speed; torpedo missed ahead.

3.45 p. m.—Torpedo fired by a submarine passed under *Landrail* and crossed the line of battle cruisers; *Landrail* reported between *Tiger* and *New Zealand*, *Lydiard* 60 yards ahead of *Queen Mary*.

4.11 p. m.—Torpedo passed under *Princess Royal* amidships.

Torpedoes seen.	Avoided.	Missed.	Passed under.	"Probability."
3	1	1	1	1

I.—Attack on Third Battle Cruiser Squadron by German Light Cruisers, 5.45 to 6.15 p. m.

5.45 p. m.—*Invincible* sighted several torpedoes fired by a light cruiser, afterwards destroyed; avoided by turning away.

6.13 p. m.—*Indomitable* sighted five torpedoes, fired apparently by light cruisers; avoided by turning away; one ran alongside for 20 yards but ship outran it; two passed astern.

6.15 p. m.—*Inflexible* sighted three torpedoes; one passed slowly down port side 20 feet off; one passed astern; one passed under, and was seen on far side.

Torpedoes seen.	Avoided.	Passed under.	"Probability."
8 + uncertain.	7 + uncertain..	1	3 to 4

III.—Concentracted Attack on First Battle Squadron, 6.45 to 7.15 p. m.

Eight or nine torpedoes were seen. The first (doubtful report) stopped short on starboard bow of *St. Vincent*, the second struck *Marlborough* on the starboard bow. Another stopped short 100 yards on starboard quarter of *St. Vincent*, who had altered course away on sighting it. The remainder crossed the track (see list below) and were avoided by the use of helm.

No.	Time.	Reported by—	Turned.	Result.
1	6.40	*St. Vincent*		Stopped 200 yards short.
2	6.54	*Marlborough*		Hit.
3	7	*St. Vincent*	Away	Stopped 100 yards short.
4	7	*Marlborough*	Toward	Passed under stern.
5	7.1	*do*	Away	Passed ahead and close under bow.
6				
7	7.9	*Revenge*		Passed astern.
8	7.8	*Agincourt*	Not stated	Just missed astern.
9	7.15	*Neptune*	Away, then toward	Near port quarter.

These torpedoes may have been fired by:

(*a*) Disabled cruiser about 10,000 yards on starboard beam (reported by *Marlborough* and *Hercules* as *Roon*, by *Revenge* as a light cruiser, by *Neptune* as a three-funneled ship). It was probably the *Rostock*.

This is thought improbable, as the torpedo would have to possess a speed and range of 30 knots to 12,000 yards at least. It is not impossible, however, that the *Rostock*, being a modern light cruiser, may have had a torpedo of this speed and range.

(*b*) *Neptune* believed two submarines were sighted about 2 miles off. *Revenge* considered she hit the submarine which torpedoed *Marlborough*.

Agincourt sighted a periscope at 7 p. m., and considered torpedo, which missed astern of her, was fired by a submarine.

Barham reported firing on a submarine about this time.

(*c*) *Neptune* and *Collingwood* reported torpedo-boat destroyers.

It appears most probable that these eight torpedoes were fired by two submarines (carrying at least two bow and two stern tubes each). They may have come from the torpedo-boat destroyers, but in view of a torpedo-boat destroyer attack having definitely been made a few minutes later, this is less likely, except in *Neptune's* case, No. 9, 7.15 p. m.

No special remarks were made on the running of these torpedoes. Except for the two which stopped short of *St. Vincent*, they all appear to have been running efficiently.

The apparent concentration on *Marlborough* is probably due to the center ship of the squadron having been taken as point of aim.

Torpedoes seen.	Hit.	Short.	Avoided.	"Probability."
8 or 9	1	1 or 2	6	2

IV.—Concentrated Attack on First Battle Squadron, 7.33 to 7.38 p. m.

Eleven (possibly 12) torpedoes were seen. One appeared to pass under *Marlborough*. The others were avoided by a general turn away, and by the use of helm.

1 and 2. Passed one on either side of *Collingwood*, about 200 yards apart, running neck and neck in a course of about 60° port. *Colossus* and *Collingwood* turned away. *Colossus* reports torpedo running slow and erratic, leaving a broad track. One passed 30 yards ahead of *Collingwood*, the other 10 yards astern.

3 and 4. Sighted on starboard bow of *Marlborough*, who turned to port, and subsequently back to starboard. One passed ahead, the other close under stern.

5. Sighted on starboard beam of *Marlborough*, appeared to pass under ship abreast of "Y" turret.

6. Broke surface 25 to 30 yards on starboard beam of *Revenge* after alteration of course to port.

7. Passed 30 yards astern of *Revenge* at approximately the same time as 6. *Revenge* reported these torpedoes running straight, and keeping good depth, but at end of run.

TORPEDOES FIRED BY ENEMY IN THE ACTION ON 31 MAY 1916.

DIAGRAMS SHOWING CONCENTRATED ATTACKS ON FIRST BATTLE SQUADRON.

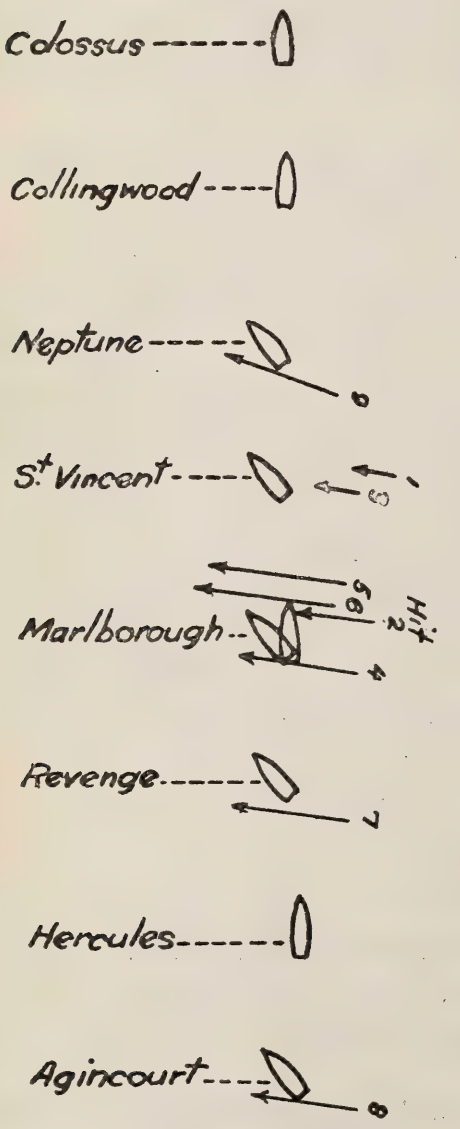


DIAGRAM 1.—Attack on First Battle Squadron about 7 p. m.

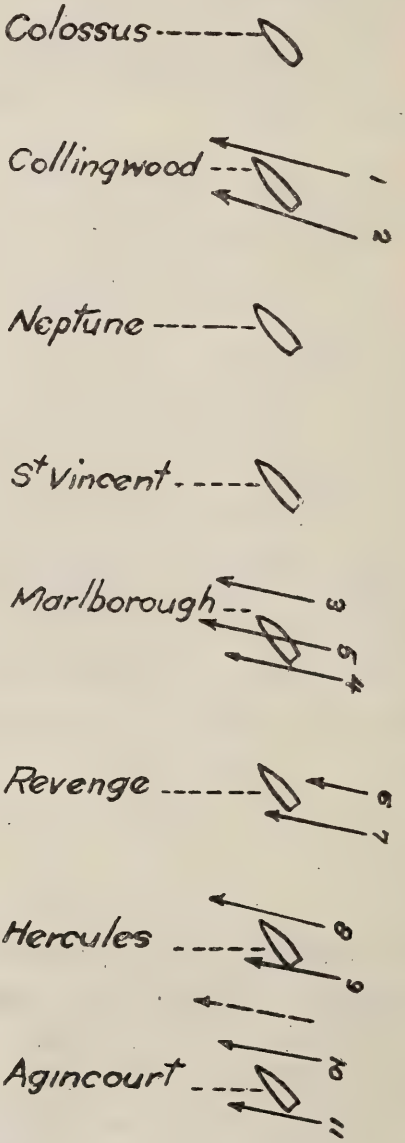


DIAGRAM 2.—Attack on First Battle Squadron about 7.30 p. m.

8 and 9. Sighted 800 yards on starboard quarter of *Hercules*, after the turn to port. Course altered 5 points to port to avoid 8, which passed 40 yards ahead; 9 was seen bearing starboard 100°, distant 700 yards, was lost sight of when course was altered for 8, was last seen bearing starboard 160°, and it is estimated to have passed very close to stern. Ship's going to port was checked to

avoid swinging over on to this torpedo, which was, however, not seen again on the port side.

10. Two torpedoes sighted by *Agincourt.* Avoided by use of helm; passed 50 to 100 yards ahead. The latter was probably 9 above.

11. Just missed stern of *Agincourt;* slower running. Avoided by use of helm. *Barham* reported seeing four tracks ahead between 7 and 8 p. m. *Malaya* reported seeing several tracks; not verified.

These torpedoes appear to have been fired by a flotilla of torpedo-boat destroyers. Bearing and distance reported as follows:

Time.	Ship reporting.	Bearing.	Distance.	Number.
H. m.			*Yards.*	
7 40	*Colossus*	70° starboard	6,000	1
7 30	*Collingwood*	5 abaft starboard beam (?95° starboard)	1,000 (?10,000)	3 or 4
7 15	*Neptune*	WNW	8,000–10,000	6 to 8
7 35	*Revenge*	70° starboard		1
7 35	*Agincourt*	Starboard beam		

No. 1 appears to have been running badly, and probably cold.

No. 5 appears to have passed under *Marlborough.*

Nos. 6 and 7 are reported as running well, but at the end of their run.

No. 11 seems to have been running slow.

The range and bearing given by *Colossus* is consistent with a 28-knot 7,000-yard torpedo, such as the Germans are known to have had in large numbers.

The apparent concentration on *Marlborough* was probably due to the center ship of the squadron having been taken as a point of aim.

Torpedoes seen.	Under.	Avoided.	"Probability."
11 or 12	1	10 or 11	4

V.—Torpedoes Fired at Cruisers at Head of Line about 6.40 p. m.

(*a*) *Tiger* reported, 6.37 to 6.39 p. m.—Three torpedoes passed close to stern. Course altered for one, but the others passed clear.

(*b*) *Princess Royal* reported, 6.40 p. m.—Torpedo passed under amidships.

(*c*) *Duke of Edinburgh* reported, 6.47 p. m.—Track of torpedo observed passing starboard to port. Helm put hard over to avoid, or it would otherwise have struck. The torpedo passed 50 yards astern.

Torpedoes seen.	Avoided.	Passed under.	Missed.	"Probability."
5	2	1	2	2

VI. Torpedoes Fired at Cruisers at Head of Line about 7.30 p. m. by German Torpedo-Boat Destroyers.

(*a*) *Inflexible* reported, 7.25 p. m.—Track of torpedo passed astern at 150 yards (fired by torpedo boat).

(*b*) *Calliope*, 7.25 p. m.—Attacked by eight torpedo-boat destroyers, bearing starboard 75°, 7,000 yards on parallel course. Speed of *Calliope*, 27½ knots; enemy estimated 33 knots. Four torpedoes seen—

Seen.	Passed.
(*a*) 100 yards off	0 to 5 yards ahead.
(*b*) 150 yards off	5 to 15 yards astern.
(*c*) Well ahead	100 to 150 yards ahead.
(*d*) Well ahead	400 to 500 yards ahead.

Torpedoes were running straight and well, leaving tracks like cold torpedoes.

(*c*) *Caroline*, 7.35 p. m.—Enemy fired from behind smoke screen, *Caroline* steering toward enemy. First torpedo passed down port side, second down starboard side; surfaced when abeam at end of run and passed close to stern.

Appeared to be an 18-inch, and was painted red.

Torpedoes seen.	Missed.	"Probability."
7	7	2

VII.—Single Torpedoes Fired at Fleet.

(*a*) *Iron Duke–Oak* reported, 7.35 p. m.—Track passed 200 yards ahead of *Iron Duke*. The torpedo traveled slowly, and finished its run 2,000 yards on port side of line and then sank.

(*b*) *Iron Duke–Benbow* reported, 8.27 p. m.—Observed torpedo crossing *Iron Duke's* bows.

(*c*) *Barham*, 6 to 7 p. m.—Four torpedoes passed through the line close to *Barham* and were avoided by turning away. A submarine was fired on about this time.

(*d*) *Malaya*.—Several tracks reported, but none verified.

(*e*) *St. Vincent*.—Track seen between 8 and 8.10 p. m., which passed between *Neptune* and *St. Vincent*.

(*f*) *Agincourt* reported, 8.25 p. m.—Observed a track on starboard side and used helm. Torpedo came to surface apparently at end of run, 150 yards on starboard bow.

(*g*) *Inflexible* reported that at 8.35 p. m. the track of a torpedo crossed her bows.

Torpedoes seen.	Avoided.	Missed.	"Probability."
9+uncertain	5	4+uncertain	3 to 4

VIII.—Individual Attacks on *Champion* and Torpedo-Boat Destroyers by German Torpedo-Boat Destroyers.

(*a*) *Shark* was attacked at about 7 p. m. by two torpedo-boat destroyers with two torpedoes at a range of 1,500 to 1,800 yards; one hit and sank her.

(*b*) *Unity* was attacked at 10 p. m. by a German torpedo-boat destroyer with one torpedo. Enemy's range, 1,000 yards, bearing 160°; course two points outward. Torpedo was seen to leave tube. Speed was increased, helm put hard over toward the enemy; torpedo passed 30 feet astern.

(*c*) *Garland* was attacked at 9 p. m. by two German torpedo-boat destroyers with two torpedoes.

Enemy's range 600 yards, bearing 79° opposite course. Approach of torpedoes both seen and heard; ran on surface. Both missed astern, by 10 feet and 20 yards.

(*d*) *Garland* was attacked again at 2.30 a. m. by one German torpedo-boat destroyer with one torpedo.

Enemy's range 4,000 yards, bearing 67°, opposite course. Torpedo ran on surface and missed astern by 500 yards.

(*e*) *Champion* was attacked at 3.30 a. m. by four torpedo-boat destroyers with two torpedoes. Avoided by use of helm, one passing under bows, one missing close astern.

Torpedoes fired.	Hit.	Missed ahead.	Missed astern.	Not stated.	"Probability."
8	1	1	5	1	2

NOTE.—Three out of the eight ran on the surface.

NARRATIVE OF THE BATTLE OF JUTLAND.

[*Note.*—This narrative has been compiled from the account of the battle of Jutland by Arthur Pollen in his book "The Navy in Battle;" from a United States War College article on the battle of Jutland compiled by Lieut. Commander H. H. Frost, U. S. N.; and from various English and German reports. The narrative does not pretend to be complete. Special emphasis has been placed upon the part of the torpedo in the battle. The narrative, so to speak, is merely a framework to make intelligible the importance and probable relation of torpedo attacks to the main action. This narrative can be most profitably studied in connection with the preceding detailed accounts of torpedo attacks in the battle of Jutland.]

On the early afternoon of 31 May 1916, the English Grand Fleet, according to Admiral Jellicoe's report, was running on its particular sweep through the North Sea. The Grand Fleet was divided into two main detachments—the main body under the commander in chief, Admiral Jellicoe, and the scouting or battle cruiser force under Vice Admiral Beatty. The main body of the Grand Fleet consisted of 25

dreadnaught battleships, 3 battle cruisers, 9 armored cruisers, 10 light cruisers, and about 63 destroyers. About 50 miles to the southward of the main body was the battle cruiser force commanded by Vice Admiral Beatty, which was composed of *Lion* (flagship), *Tiger*, *Queen Mary*, *Princess Royal*, *New Zealand*, and *Indefatigable*. This battle-cruiser fleet was accompanied by the fifth battle squadron, composed of *Barham* (flagship), *Valiant*, *Warspite*, and *Malaya*. In addition, there were the First, Second, and Third Light Cruiser Squadrons and about 84 destroyers.

According to Admiral Beatty's report, the battle cruisers were steering towards the northward to join the commander-in-chief. The light cruisers were formed in a screen to the rear of the capital ships about 15 or 20 miles from the battle-cruiser fleet.

At 2.20 p. m. *Galatea*, in the east sector of the light cruiser screen surrounding the British battle cruiser fleet, reported to Admiral Beatty the presence of enemy vessels—actually the second German light cruiser group to the east.

Admiral Beatty, with the capital ships, at once changed course to south-southeast with the intention of warding off the battle forces from their base. At 2.25 *Galatea* reported the enemy force was considerable. At 2.35 Admiral Beatty observed a great deal of smoke to the eastward. At 2.45 he ordered *Engandine* to send up a seaplane. By 3.08 this order had been executed, but the information obtained was too late to be of great value. At 3.30 the forces of Admirals Beatty and Hipper sighted each other. As soon as Admiral Beatty made out the German battle cruisers he formed line of battle—*Lion*, *Tiger*, *Queen Mary*, *Princess Royal*, *New Zealand*, and *Indefatigable*. He then changed course six points to the right, steadying on east-southeast. As soon as Admiral Hipper made out the English forces approaching he went column left about 14 points and steadied on course south-southeast. His light cruisers fell in astern with him. Admiral Beatty had so formed his ships for action in a line of bearing that in the northeasterly wind the smoke of one ship should not interfere with the fire of the next. His course, east-southeast, converged on that of the enemy.

Just as Admiral Beatty had given the order to form in a line of bearing, a torpedo was fired by a submarine at H. M. S. destroyer *Nicator*. As the torpedo ran on the surface, *Nicator* was able to avoid it by turning away at full speed. The torpedo missed ahead by the time the line was formed; the range was about 23,000 yards. The destroyers *Lydiard* and *Landrail* were on the engaged (port) bow of *Lion* and Thirteenth Flotilla ahead. At 3.45 another torpedo fired by a submarine passed under *Landrail* and crossed the line of battle cruisers. *Landrail* reported between *Tiger* and *New Zealand; Lydiard* 60 yards ahead of *Queen Mary*. At 3.48 the

range had been closed to 18,500 yards, when both sides opened fire simultaneously. The Fifth Battle Squadron was at that time out of range. When the range had closed to about 14,000 yards or less, parallel courses were steered and kept until the end of this phase of the engagement.

The Fifth Battle Squadron consisted of four ships of *Queen Elizabeth* class, under the command of Admiral Evan-Thomas. At about the time Admiral Beatty formed his battle line, they were about 10,000 yards off; not straight astern of the battle cruisers, but bearing about half a right angle to port. The course that would bring the enemy into the line of the battle cruiser fleet then was not parallel to that steered by Admiral Beatty, but a course converging on it. It was this that enabled them, with increased speed, to come into action at 4.08 though only then at the range of 20,000 yards.

At 4.03 the sixth ship in the English column, *Indefatigable* (Capt. Sowerby), was hit by a shell in a vulnerable spot. The destruction of the ship was instantaneous and almost the entire personnel, including the captain, were lost. An almost exactly similar misfortune later befell *Queen Mary*, which was sunk at 4.30. Neither ship had in any sense of the word been overwhelmed by the gunfire of the enemy. Indeed, when *Queen Mary* went down, the enemy's fire, which had been singularly accurate and intense in the first phase of the action, had, as the Vice Admiral says in his dispatch, slackened. The superior skill, due chiefly to the wider experience of the British fire-control organization, had already begun to tell, the enemy's fire control being evidently unable to survive the damages and losses of the action.

At 4.11 p. m., just as the Fifth Battle Squadron came into action, a torpedo passed under *Princess Royal* amidships, presumably fired by one of the German battle cruisers.

At 4.15 p. m. eight units of the Fourteenth Flotilla, together with two of the Tenth and two of the Ninth, moved forward from their position well ahead of the British flagship. It was almost simultaneously countered by an identical movement by the enemy, with a considerable preponderance of forces—15 destroyers supported by a light cruiser, *Regensburg*, against the 12 British destroyers. These two forces met before either had reached a position for effecting its main purpose, viz, the torpedo attack on the capital ships. The Germans were driven back, two of their destroyers sunk, and, what was more important, it was made quite impossible for them to carry through a torpedo attack against the English ships. But just as the enemy boats had been unable to get a favorable position for attacking the British battle cruisers, so, too, the English boats, delayed by this engagement, were unable to get the desired position on the enemy bow for employing their torpedoes to the best

advantage. Only 5 torpedoes out of 48 carried by the attacking British torpedo-boat destroyers could be fired against the line of the German battle cruisers before they turned at 4.52 to northwest. Three destroyers, though unable to attack from ahead, pressed forward for a broadside attack on von Hipper's ships, and naturally came under a fierce fire from the secondary armament of these vessels. One of them, *Nomad*, was badly hit and had to stop between the line. She was ultimately lost. Five other destroyers—*Petard*, *Nerissa*, *Turbulent*, *Termagant*, and *Morseby*—pushed home the attack; five torpedoes were fired at about 4.20 by *Nestor*, *Nomad*, and *Nicator*, at 6,000 yards' range, at the battle cruiser line. The *Petard*, coming into contact with a group of three or four torpedo-boat destroyers at 4.25, fired a torpedo at the group, sinking the leader. Within the next 15 minutes she fired three more torpedoes at the second ship in the German line, at 7,000 yards' range. All three passed very close to *Moltke*, but it is doubtful if they hit.

At 4.38 Commodore Goodenough, in command of the Second Light Cruiser Squadron (*Southampton*, *Birmingham*, *Lowestoft*, *Nottingham*, and *Dublin*), which had gotten to its action station ahead of Admiral Beatty's line a little before the engagement opened with von Hipper at 3.30, reported the advent of Scheer with the German battle squadron from the south. At 4.42 Admiral Beatty, from *Lion*, made out the German battle fleet. He immediately went column right for 18 points and headed to the northward.

At the same time Admiral Hipper performed exactly the same maneuver, taking station ahead of the German battle fleet. Five more torpedoes were fired on the German battle cruisers at 7,000 yards after the turn to northwest, two by *Nerissa*, one of the attacking flotilla, and three from the British battle cruiser line—two from *Lion* and one from *Morseby*, stationed on her engaged bow. *Morseby* and *Nerissa* both claimed hits on the rear ship of the line at approximately the same time. As *Fearless* reported a battle cruiser leaving the line at 5.10, it appears probable that one hit at least was obtained. This may have been *Von Der Tann*, but there is considerable doubt as to whether this ship was actually torpedoed.

While Admiral Beatty turned, Commodore Goodenough in *Southampton* took position to ascertain the precise number and composition of the German forces. To do so the commodore took his squadron under the fire of the German dreadnaughts. He went on until a range of about 13,000 yards was reached, and, having obtained the information he wanted, returned to form with the cruiser fleet on its northerly course. His squadron was barely hit, for though the fire was intense, the change of range was too rapid and far too difficult for the German fire control to surmount.

On the German battle fleet being sighted in the rear of the battle cruisers, they were attacked by the British cruiser *Nottingham* with an extreme range at 16,500 yards (4.41 p. m.). Four minutes later (4.45) the British destroyers *Nestor* and *Nicator*, which had fallen behind during the destroyer attack on the battle cruisers at 4.15, pressed home an attack on the leading squadron of the battle fleet. *Nestor* fired two torpedoes at 3,000 yards before she was stopped and sunk by gunfire. *Nicator* escaped to the westward, under heavy fire, after firing one torpedo at 3,000 yards.

Admiral Evan-Thomas, with the Fifth Battle Squadron, kept on and engaged the German battle cruisers, while Admiral Beatty made his 18-point turn.

At 4.52 Admiral Evan-Thomas countermarched upon a signal from Admiral Beatty. At 4.57 the turn was completed, and this force fell in behind the battle cruiser fleet under long-range fire from the leading ships of the German battle fleet.

At 4.57 the First and Third Light Cruiser Squadrons took station ahead of the battle cruiser fleet, as did the First Flotilla. The Thirteenth Flotilla took station near the Fifth Battle Squadron. The Second Light Cruiser Squadron took station on the port quarter of the battle cruiser fleet.

At 4.57 Admiral Scheer took command of all the German forces. The group of light cruisers and one destroyer flotilla were in the lead. On the port quarter were the battle cruisers, followed at a considerable interval by the battle fleet. The remaining destroyers and light cruisers were on the unengaged side of the battle cruisers and battle fleet.

From the time when Scheer came into action, at 4.57, till 6, Admiral Beatty kept the range at 14,000 yards. *Moorsom*, one of the ships of the second light cruiser squadron, attacked the battle fleet at 8,500 yards, firing two torpedoes at 5.10 against the second ship of the German line, and 20 minutes later two more against the third ship.

Nomad, which had remained stopped between the lines as a result of a hit by the battle cruisers at 4.20, was sunk by the gunfire of the battle fleet at 5.15.

At 5.35 Scheer began hauling round to the east, changing his course gradually away from the British line, having probably by this time received information of the approach of the Grand Fleet. Admiral Beatty turned with the enemy, increasing speed so as to maintain his general relation to the head of the German line. Scheer realized that if the High Seas Fleet were to be saved he must make good his escape during the deployment of the Grand Fleet, which was advancing in three columns. The circumstances of the moment

were especially favorable for such tactics. The conditions of the atmosphere that made long range gunnery difficult made the establishment of smoke screens to render it more difficult still more easy. The wind had dropped, the air was heavy and vaporous, the ships were running from one bank of light fog to another. It was a day on which smoke would stay where it was made, and cling to the surface of the sea, mingling with and permeating the water-laden atmosphere. These were just the conditions in which, were a torpedo attack delivered, it would have a maximum deterrent effect upon the enemy. Scheer's gradual turn to the east may therefore be interpreted as an attempt to open up the range preliminary to escape under cover of a concentrated torpedo attack. A favorable opportunity for this move did not present itself till 6.45.

By 5.35 the English Grand Fleet had reached the immediate vicinity of the scene of battle and its advance detachments were entering into the engagement. The Grand Fleet consisted of the First, Second, and Fourth Battle Squadrons, under the command of Jellicoe, in *Iron Duke*. While the main body advanced at high speed, probably 20 knots, towards the English forces under Admiral Beatty, the cruiser force, being able to steam at from 3 to 8 knots faster than the battleships, had been sent ahead to reinforce Admiral Beatty. The Third Battle Cruiser Squadron, under Admiral Hood, in *Invincible* (flagship), with *Indomitable* and *Inflexible*, led the advance, followed by the First and Second Cruiser Squadrons. The First Cruiser Squadron, commanded by Rear Admiral Arbuthnot, was composed of the armored cruisers *Defence*, *Warrior*, *Black Prince*, and *Duke of Edinburgh*. The Second Cruiser Squadron, commanded by Rear Admiral Heath, was composed of five armored cruisers—*Achilles*, *Cochrane*, *Hampshire*, *Shannon*, and *Minotaur*. The light cruisers *Chester* and *Canterbury* were attached to the Third Battle Cruiser Squadron.

At 5.30 Admiral Hood made out the fire of guns to the southwest. He sent *Chester*, one of the two light cruisers attached to his squadron, to clear up the situation. *Chester* ran into four German light cruisers and fought them single handed for some time. The mêlée between the *Chester*, English destroyers, and German light cruisers at the head of the German line now developed into a very bitter struggle, each side throwing fresh forces into the engagement.

At about 5.57 the English First and Second Cruiser Squadrons (Rear Admirals Herbert L. Heath and Sir Robert Arbuthnot) entered the fight from northeast, and at 6:00 light cruiser *Canterbury* and the entire Third Battle Squadron reached the scene. In face of this overwhelming force, the German light cruisers retired towards the battle cruisers. At 6:00 *Shark* torpedoed a cruiser with four funnels, probably the *Rostock*, which appeared to catch fire. At 6.05 *Onslow* fired a torpedo at 8,000 yards range at the leading ship of the German battle

cruisers. The light cruiser *Wiesbaden* was crippled and lost all speed. She was torpedoed by *Onslow* at 6.15, the torpedo hitting under fore conning tower at 4,500 yards range. *Falmouth* also claimed a hit on a disabled light cruiser at 6.21, but there is no evidence that *Wiesbaden* was hit twice. At 6.18 *Onslow* fired two more torpedoes at 8,000 yards at the fourth German ship of the *Kaiser* class before she was disabled by gunfire.

Rear Admiral Arbuthnot, with the First Cruiser Squadron, in pursuit of the German light cruisers, stood about west-southwest into a position directly between the two battle fleets. The Germans overwhelmed it by a heavy fire. At 6.17 *Defence*, flagship of Admiral Arbuthnot, sank. *Black Prince*, *Warrior*, badly damaged, made off to the northwest. *Duke of Edinburgh*, the last ship in the column, escaped and joined the second cruiser squadron. Admiral Jellicoe reports that "it is probable that Sir Robert Arbuthnot, during his engagement with the enemy light cruisers and in his desire to complete their destruction, was not aware of the approach of the enemy heavy ships, owing to the mist, until he found himself in close proximity with the main fleet, and before he could withdraw his ships they were caught under a heavy fire and disabled."

At 6.14 Admiral Jellicoe gave the order to deploy from the formation of approach into line of battle. Hood, in *Invincible*, with *Inflexible* and *Indomitable*, was ordered by Admiral Beatty at 6.20 to take station ahead of the line. The fifth battle squadron, under Evan-Thomas, took position in the rear of the deploying Grand Fleet. During this maneuver the *Warspite's* steering gear jammed and she headed toward the German battle fleet. Although hit many times, she was able to escape by steering with her engines.

The British ships after the deployment were arranged as follows: Hood, in *Invincible*, followed by *Inflexible* and *Indomitable;* Beatty, in *Lion*, followed by *Tiger*, *Princess Royal*, and *New Zealand;* the Second Battle Squadron, commanded by Vice Admiral Jerram; the Fourth Battle Squadron, including the flagship *Iron Duke*, commanded by Admiral Jellicoe; the First Battle Squadron, commanded by Vice Admiral Burney (*Colossus*, *Collingwood*, *Neptune*, *St. Vincent*, *Marlborough*, *Revenge*, *Hercules*, *Agincourt*); and lastly, the Fifth Battle Squadron, commanded by Admiral Evan-Thomas, now consisting of three ships—*Barham*, *Valiant*, and *Malaya*.

But before the deployment could be completed the Battle Fleet became engaged. At 6.17 the first squadron opened fire on the leading German battleships. The other two squadrons opened fire on the crippled *Wiesbaden*, and at 6.30 shifted their fire onto the German battle fleet.

By 6.25 the English battle cruisers had closed the range to 8,000 yards and had *Lützow*, von Hipper's flagship, under heavy fire.

Simultaneously with this movement, the third light cruiser squadron, under Rear Admiral Napier, composed of *Falmouth*, *Liverpool*, *Gloucester*, *Yarmouth*, and *Ophelia*, from its position on the starboard bow of the British battle cruisers, pushed on to within 7,000 yards of the German battle cruisers. *Ophelia* and *Yarmouth* both fired torpedoes at 6.30 against the leading ship of the German line. As the *Lützow* is reported to have left the line about six minutes later, it is quite probable that the torpedo of *Yarmouth*, fired at 7,000 yards range, reached its mark. The *Lützow*, flagship of Admiral von Hipper, had previously been severely damaged by 15 shells of large caliber. Admiral von Hipper entered a destroyer to shift his flag to another of his ships. At about the same time the *Invincible*, flagship of Admiral Hood, was destroyed by the first and almost the only shell that hit her.

Between 6.20 and 6.40 the heaviest fighting of the day occurred. The English fire was concentrated on the battle and light cruisers at the head of the line and on the four leading battleships. The English battle cruisers bore the brunt of the punishment on the English side.

By 6.40 the visibility conditions had become much worse. At about 6.30 the two leading English battle squadrons opened fire; the German commander-in-chief had probably begun to realize the danger of his position with the English fleet so far forward on his port bow. Scheer by this time had had his fleet on an easterly course for 35 minutes, awaiting the opportunity to turn a right angle or more, so as to retreat under cover of torpedo attacks. At 6.45, therefore, Scheer launched a concentrated torpedo attack on the First Battle Squadron. The Third Destroyer Flotilla attacked the First Battle Squadron, and at the same time covered the German battle fleet with a smoke screen. One German destroyer was lost in the attack. Eight or nine torpedoes were seen; the first stopped short on the starboard bow of *St. Vincent*, the second struck *Marlborough* at 6.54 on the starboard bow. Another stopped short 100 yards on starboard quarter of *St. Vincent*, who had altered course away on sighting it. The remainder crossed the track and were avoided by use of helm. (See "Torpedoes Fired by the Enemy."—III. Concentrated Attack on First Battle Squadron, 6.45 to 7.15 p. m., p. 18.)

This concentrated torpedo attack had the desired effect. The enemy, Jellicoe reports, "constantly turned away and opened the range under the cover of destroyer attack and smoke screens as the effect of British fire was felt." "Opened the range" meant that the object of the torpedo attacks had been attained. For a quarter of an hour the closing movement of the Grand Fleet was converted to an opening movement. Scheer had prevented the close action that he dreaded. He had gained the time needed to turn his whole force from an easterly to a southwesterly course. By 6.50 Admiral Beatty

reports "the battle cruisers were clear of the leading British battle squadron, then bearing north-northwest, 3 miles from *Lion*, the third ship in the line." "At 7.07," he continued, "we hauled round gradually to southwest by south to regain touch with the enemy (who were lost to sight at about 6.50). At 7.14 again sighted them at a range of about 15,000 yards * * *; we re-engaged at 7.17 and increased speed to 22 knots."

About 7.14 the opposing forces again sighted each other. The British battle fleet again entered into action, but the First Battle Squadron was probably the only one to get in any effective fire, as it was stated by Admiral Jellicoe that the Second Battle Squadron was not engaged until 7.20. The Fourth Battle Squadron seems to have been too far behind, and the Fifth Battle Squadron probably took little part in the action between the two battle fleets, having been under severe fire at the time of the deployment of the Grand Fleet.

Again, to disengage the German battle fleet, Admiral Scheer ordered another destroyer attack. At 7.25 two flotillas, backed up by the light cruisers, advanced against the English Fleet. Admiral Jellicoe ordered the Fourth Light Cruiser Squadron to counter the attack. This squadron quickly moved out between the lines and drove the German destroyers back with the loss of one boat. During this torpedo attack, *Inflexible* at 7.25 reported "Saw the track of a torpedo pass astern at 150 yards." *Calliope* at the same time was attacked by eight torpedo boats bearing starboard 75° 7,000 yards on parallel course. Speed of *Calliope*, 27½ knots; enemy estimated 33 knots. Four torpedoes seen.

Seen.	Passed.
(*a*) 100 yards off	0 to 5 yards ahead.
(*b*) 150 yards off	5 to 15 yards astern.
(*c*) Well ahead	100 to 150 yards ahead.
(*d*) Well ahead	400 to 500 yards ahead.

The torpedoes were running straight and were leaving tracks like cold torpedoes. Ten minutes later a torpedo passed down port side of *Caroline;* a second down starboard side surfaced when abeam at end of run and passed close to stern; enemy fired from behind smoke screen.

At 7.33 Scheer launched a third concentrated torpedo attack against the First Battle Squadron, which again caused them to open the range by turning away in order to avoid torpedoes. This gave Scheer, under cover of a smoke screen, his second opportunity to lose touch with the Grand Fleet.

In this attack, from 7.33 to 7.48, 11 (probably 12) torpedoes were seen. One appeared to pass under *Marlborough.* The others were avoided by a general turn away and by use of helm. (See "Torpe-

does Fired by the Enemy."—IV. Concentrated attack on First Battle Squadron, 7.33 to 7.38 p. m., p. 19.

Admiral Beatty described this part of the action:

> At 7.32 my course was southwest, speed 18 knots, the leading enemy battleship bearing northwest by west. The destroyers at the head of the enemy line emitted volumes of gray smoke, covering their capital ships as with a pall, under cover of which they turned away, and at 7.45 we lost sight of them.

Admiral Jellicoe, in the attempt to close the enemy, changed course to west, but he could see them only for short periods and his fire was apparently ineffective. At 7.58 Admiral Beatty sent in the First and Third Light Cruiser Squadrons to pick up the German Fleet. At the same time Admiral Jellicoe sent in the Fourth Light Cruiser Squadron and the Eleventh Flotilla for the same purpose. At 8.20 the English battle cruisers advanced to the north in support of the light cruisers, which had apparently met the German Fleet, and an action of some 10 minutes developed between the English battle cruiser fleet, the First, Third, and Fourth Light Cruiser Squadrons, and the Eleventh Flotilla on the one hand, and the German battle cruisers, light cruisers, and two battle squadrons on the other.

During this short encounter *Calliope* at 8.28 fired a torpedo at a 7,000-yard range against the leading ship of *Kaiser* class, and at 8.30 *Princess Royal* fired a torpedo at a 10,000-yard range against the center ship of three ships of *Deutschland* class. No hits were claimed by the firing ships, but an explosion was seen to take place on a large ship, apparently of the *Kaiser* class, at 8.40. If the times are correct, this explosion may have been caused by *Calliope's* torpedo. The ship may have been the *Markgraf*, but it is not known at what time she was torpedoed.

During this engagement *Inflexible* at 8.35 saw the track of a torpedo which crossed her bow. After 10 minutes' engagement the English forces withdrew from the unequal conflict. The Grand Fleet seems to have lost sight of the Germans until after 8.20, and Admiral Beatty's scouts saw the last of the enemy at 8.38. The Vice Admiral continued search for 40 minutes longer and then fell back east into the line which was the course of the Grand Fleet when he was last in touch with it by wireless. Both fleets seem to have proceeded some distance south and to have waited for the night in the proximity of a point about equidistant (80 miles) from the Horn Reef and Heligoland.

One destroyer flotilla, the Thirteenth, and one light cruiser squadron were retained with the Grand Fleet for protection of the capital ships. The rest were disposed, as the commander-in-chief said, "in a position in which they could afford protection to the fleet and at the same time be favorably situated for attacking the enemy's heavy ships." They must have been placed north of the British force.

No British battle or battle cruiser squadron was attacked during the night.

There were numerous torpedo attacks on the German capital ships during the night. At 9.05 the First Light Cruiser Squadron, commanded by Commodore Sinclaire, made contact with the German battle fleet. *Caroline* fired two torpedoes at 7,600 yards range at the center ship of three ships of the *Deutschland* class, while *Royalist* fired one torpedo at the center ship of three ships of the *Nassau* class. Between 9.50 and 10.50 p. m. *Castor*, *Magic*, and *Marne* made an attack on several German cruisers. Four torpedoes were fired at a range between 1,500 and 3,000 yards. Other torpedo-boat destroyers did not fire, apparently because they were blinded by the glare of *Castor's* guns or because they thought the enemy might be their own ships. *Marne* and *Magic* claimed hits, apparently on different ships. Ships not identifiable.

The Second Light Cruiser Squadron got into action at 10.20 with five enemy cruisers. One torpedo was fired by *Southampton* at a group of searchlights at 1,500 yards range, hitting the leading ship, *Frauenlob*, which sank rapidly.

From 11.10 to 12.25 the Fourth Flotilla made persistent attacks on German cruisers and battleships. The enemy appears to have consisted of a battle squadron preceded by light cruisers, and it is uncertain from many of the reports whether the one fired at was a light cruiser or a battleship. Eleven torpedoes were fired at the cruisers between 11.10 and 11.43 p. m. Four hits are claimed, another doubtful. *München* and *Stettin* were probably torpedoed in this attack. The range was under a thousand yards. Five torpedoes apparently were fired at the battleships between 11.30 p. m. and 12.30 a. m. Three hits and one probable hit are claimed.

During this encounter *Tipperary* and *Fortune* were sunk by gunfire at 11.10, *Sparrowhawk* was disabled by gunfire at 11.30, and *Ardent* was sunk by gunfire at 12.25.

From 2 to 2.30 a. m. the Twelfth Flotilla made an attack on a squadron of four dreadnaught battleships or battle cruisers. The enemy appears to have consisted of four two-funneled ships, class uncertain. Seventeen torpedoes were fired at an average range of 3,000 yards, and eight hits are claimed on the second, third, and fourth ships of the line. The second ship appeared to blow up, but this has not been confirmed. Actual hits appear to be as follows:

Second ship.—At least one hit, perhaps more; two under bridge, one abreast mainmast. Appeared to blow up.

Third ship.—One between funnels.

Fourth ship.—One amidships.

These ships were probably *Rheinland*, *Nassau*, and *Westfalen*. All returned to harbor.

During this engagement the upper deck of *Onslaught* was cleared by gunfire at 2.08, after she had fired four torpedoes.

At 2.37 *Morseby* sighted four predreadnaughts, possibly a squadron of the *Deutschland* type. One torpedo was fired at 3,700 yards. *Morseby* claimed a hit on the third ship of the line, but the ship is not identifiable. *Champion* was attacked at 3.30 a. m. by four torpedo-boat destroyers with two torpedoes, which were avoided by use of helm; one passed under bow, one close astern. Eight torpedoes in all were fired, three of which ran on the surface. *Champion's* encounter with four destroyers at 3.30 a. m. was the only engagement after daybreak until a Zeppelin was encountered at 4 a. m.

The battle of Jutland was over; the German Fleet had made good its escape.

The only other occurrences were the attacks on the morning of 1 June against single ships of the Grand Fleet by submarines. *Marlborough* at 9.30 a. m. sighted two submarines 8 miles away, steering for the ship. At 10.52 a. m. she observed oil patches 2 miles astern; one torpedo passed along broadside 2 cables off; speed of ship, 14 knots. At 9.35 a. m. *Warspite* saw two torpedoes pass close to ship, one on each side. No track of submarine was seen; speed of ship, 19 knots. At 11.42 a. m. *Warspite* saw a periscope close to bow, tried to ram, but missed by a few yards. At 2.15 a. m. *St. Vincent* saw the track of a torpedo, which was continually breaking surface and stopped about 300 yards short.

TORPEDO ATTACKS ON SURFACE SHIPS OF WAR.

1 January 1918.

(10301A, 11066)

The following torpedo attacks on British surface ships of war have been compiled from the most authentic and reliable sources. The list does not pretend to be exhaustive, as only attacks of special interest have been included.

I.—Action of 28 October 1914 in Heligoland Bight.

At 8.30 a. m. *Arethusa*, steaming 28 knots, was attacked with two torpedoes by a light cruiser (supposed *Frauenlob*) bearing 66° port, 3,000 yards (extreme visibility), steaming 12 knots on a parallel course. Both torpedoes stopped 300 yards short.

Remarks.—This is consistent with speed and range of torpedo recovered from *Emden*, 24 knots to 4,000 meters. The torpedo's course must have been 20° to 25° starboard, and it would have had to run about 5,000 yards to reach.

Between 8 and 8.30 a. m. the First Light Cruiser Squadron, steaming 23 to 24 knots, was attacked with three torpedoes by a large

destroyer reported bearing 100° port, 7,500 yards, by *Nottingham*, 90° port, 6,000 yards, by *Lowestoft*. The destroyer turned to a parallel course to fire the first torpedo, then turned 16 points and apparently fired the second and third on an opposite course.

The first torpedo passed 50 yards astern of *Lowestoft*, the second 50 yards astern of *Nottingham*. Both these were running slow, breaking surface, and evidently at the end of their run. The track of a third torpedo was seen ahead of *Southampton*.

Remarks.—These results are consistent with a speed and range of 28 knots to 12,000 yards. The formation of the squadron is not known, but it would seem that two only out of the three passed through the squadron. The chances of hitting for these two would be about 25 to 30 per cent; in other words, it would have taken *at least* three or four torpedoes, instead of the two, to give chances of one hit.

At 9.30 a. m. *Lizard*, steaming 26 knots, course steady, was attacked with one torpedo by *V–187*, bearing 11° starboard, 5,550 yards, and steering 90° port at 25 knots. The visibility was about 7,000 yards. The torpedo stopped 300 yards short and sank; it would have passed ahead.

Remarks.—This torpedo, if it ran correctly, and if the bearings and distances are approximately correct, must have had a speed and range of about 40 knots to 1,500 yards.

At about 10.30 a. m. the battle cruiser squadron, steaming full speed, was attacked with three torpedoes by apparently one submarine. The first torpedo was fired from the submarine's stern tube at the *Queen Mary*, bearing 90° port from her, distance not stated. Owing to the *Queen Mary* being under helm, the torpedo passed about 15 yards ahead. The approach of the torpedo was seen.

The second torpedo passed 50 yards astern of the *Princess Royal*, who did not see it, and 100 yards ahead of the *New Zealand*, who did.

The third torpedo passed 80 yards astern of the *Invincible;* the track was observed just before it crossed her wake.

Remarks.—From the use of the stern tube by the submarine and the bearing from which she fired at *Queen Mary*, it may be conjectured that the rapid movement of the battle cruisers spoiled her attack. It is presumed that after missing ahead of the *Queen Mary* she reduced the deflection too much for the others.

Two torpedoes apparently passed through the squadron; the chances of hitting on these grounds would be about one in three, so the submarine was decidedly unlucky. The chief cause of her failure was evidently the confusion caused by high speed and frequent alteration of course.

During the forenoon submarines also attacked *Southampton*, missing astern; *Fearless*, missing, one 100 yards ahead, one 50 yards

astern; *Landrail*, missing 12 feet astern; *Linnet*, torpedo stopped 10 yards short; *Lark*, missing, one astern, one parallel at 30 yards.

Summary for the action.—

LONG RANGE. [Torpedo boat destroyer or light cruiser.]		SHORT RANGE. [Probably submarine.]	
Passed through line	1	Missed ahead	2
Nearly short	2	Missed astern	6
Stopped short	3	Short	1
	6	Parallel	1
			10

II.—Submarine Attacks on Third Cruiser Squadron, 9 October 1914.

On 9 October 1914, at 3.08 p. m., the cruiser *Antrim* (10,850 tons displacement), steaming 12 knots, was attacked with two torpedoes by a submarine bearing 45° starboard 600 yards. On sighting the periscope *Antrim's* action was as follows: Hard-a-port; full speed ahead port; full speed astern starboard; full speed both, steering for submarine.

The torpedoes passed 10 yards and 50 yards ahead.

Remarks.—This attack emphasizes the importance of zigzagging. The checking of *Antrim's* way undoubtedly saved her. The divergence of the submarine torpedo, 40 yards in 600, was too little to make sure of one hit.

III.—Action Between *Undaunted* and Four *L* Class Destroyers and German Destroyers *S–115* to *119*, 17 October 1914.

At 2.30 p. m. H. M. S. destroyer *Lance*, steaming 25 knots, was attacked with one torpedo by *S–115* (?), bearing 90° starboard 1,000 yards, steering a parallel course at 18 knots. The torpedo struck *Lance* between 76 and 78 stations 6 feet below low-water line, but did not explode. There was a 3-inch bulge in the plating.

At 2.30 p. m. H. M. S. destroyer *Loyal*, steaming 25 knots, was attacked with two torpedoes by *S–115* (?), bearing 70° starboard, 1,800 yards. *S–115* approached bows on, then turned to a parallel course and fired two torpedoes. *Loyal* altered course four points towards the enemy; the torpedoes were not seen again and were presumed to have missed ahead.

At 3.40 p. m. H. M. S. light cruiser *Undaunted* (3,500 tons), zigzagging at 27 knots, was attacked with two torpedoes by a torpedo-boat destroyer at over 3,000 yards range. *Undaunted* put her helm hard-a-starboard; the torpedoes passed one ahead, one astern.

At 3 p. m. H. M. S. destroyer *Legion*, steaming 20 knots, was attacked with one torpedo by *S–115* (?), bearing 45° port, 1,000 yards, and steering a parallel course at 18 knots. On seeing torpedo, *Legion* stopped starboard, helm hard-a-port, and torpedo passed 25 yards ahead.

At 3.20 p. m. a torpedo was fired at *Legion* by *S–117* (?), bearing 70° port 900 yards, same courses and speeds. *Legion* increased speed and starboarded helm; torpedo passed 30 yards ahead. Five minutes later another torpedo was fired at *Legion* by *S–119* (?), bearing 80° port 900 yards, during a 16-point turn from 0° to 180°. This torpedo apparently passed under.

SUMMARY.

Missed ahead	3
Missed astern	1
Missed, not seen	2
Missed under	1
Hit, did not explode	1
Total	8

IV.—Action of 24 January 1915 off Dogger Bank.

Two torpedoes were reported to have crossed the battle cruiser line, consisting of *Lion*, *Tiger*, *Princess Royal*, *New Zealand*, and *Indomitable*, in the order named. The first, fired by *Blucher*, the last ship in the German line, at 6,000 yards range, passed 30 yards astern of *Tiger*. The second passed 200 yards astern of *Princess Royal* and 40 yards ahead of *Indomitable*. *Indomitable* reports this as having been fired by a submarine. The track was first seen 100 yards on her port bow.

V.—Attack on *Sarnia* Auxiliary, 11 April 1915.

At 8.25 a. m. *Sarnia*, steaming 21 knots, was attacked with one torpedo by *U–24*, bearing 85° port 600 yards, steering 90° starboard. Discharge of torpedo was seen and helm put hard-a-starboard. Torpedo passed 30 yards astern. Two minutes later another torpedo was fired by a submarine (believed at the time to be another, but probably the same one) bearing 30° starboard 250 yards, and reported steering 90° port (more probably firing stern tube). The helm had just been put amidships from the previous attack. The discharge was again seen, and helm put hard-a-port, starboard engine full speed astern. The torpedo passed 3 yards ahead.

Remarks.—If two submarines were present they must have been very close together. It is much more likely that there was only one. This attack shows both the possible value of a stern tube and the danger incurred by swinging too far when turning towards a submarine.

VI.—Attack on *Dublin*, 9 June 1915.

At 8.38 a. m. H. M. S. light cruiser *Dublin* (5,400 tons displacement), zigzagging at 18 knots, was attacked with three torpedoes fired almost simultaneously by a submarine, supposed Austrian *U–5*, bearing 30° port 400 yards. The helm was put hard-a-starboard when the periscope was seen.

One torpedo passed ahead, one struck port side in No. 1 boiler room 4 feet below water line, the third ran down the port side and under the stern.

Damage.—Hole 12 by 10 feet.

Remarks.—The divergence of the three torpedoes was about 200 yards in 400. An attack such as this is as near to certainty as it is possible to come. Two torpedoes might have struck *Dublin* at any speed between 12 and 24 knots had she not turned as she did; one, at any speed from 7 or 8 knots upward.

The shallowness of the hit may have saved *Dublin*. This may have been due to bad recovery from the dive, but especially with Ulan depth gear, is more likely due to the use of a shallow depth setting for attacking destroyers.

VII.—Submarine Attacks on Third Cruiser Squadron, 20 June 1915.

On 20 June 1915, at 7.45 a. m., cruiser *Argyll* (10,850 tons displacement), steaming 15 knots, under helm, was attacked with one torpedo by a submarine bearing 135°; range is not stated, but track was seen 1,000 yards aft. Torpedo passed 500 yards astern. (The *Argyll* was subsequently wrecked on the east coast of Scotland, 28 October 1918.)

At 9.30 a. m. the same day *Roxburgh*, steaming 18 knots, was attacked with two torpedoes by a submarine bearing 75° port 1,000 to 1,200 yards. *Roxburgh* had just zigzagged three points to port. Two tracks, slightly divergent, were seen, but no periscope. Helm was put hard-a-port on sighting the tracks, ship turned away from the torpedoes, and endeavor was made to steer between them. One finished its run 50 yards on starboard beam, the other just cleared the stern.

At 1.35 p. m. the same day *Roxburgh*, steaming 20 knots and zigzagging 2 points, was attacked again with two torpedoes by a submarine bearing 90° port 300 yards. The ship was just commencing to zigzag to port. No periscope was seen. The torpedoes were seen only just before the ship was struck, when the order hard-a-port was given. The first torpedo hit and exploded port side forward between 8 and 16 stations, depth 5 to 8 feet. The second torpedo passed 10 yards astern.

The damage was as follows: Stem broken; upper platform, protective, and lower platform deck blown up; all compartments below water line up to 23 bulkhead flooded; hole 30 by 20 feet on port side; hole on starboard side almost as big, plates having been blown out and then hanging down.

A destroyer was in company with *Roxburgh* during both attacks, but, although on same side of ship as the submarine, saw nothing of her.

Remarks.—Attack (1) can only be described as a gamble. The chances of hitting at such a bearing and distance could scarcely exceed 5 per cent.

In attack (2) the divergence was about 80 yards in 1,200, too little for an attack at close range, although it nearly succeeded on this occasion. The chances of success at ranges of over 1,000 yards against a ship which is under full command appear very slight.

Attack (3) was carried out under almost ideal conditions for the submarine. That she could reach this position demonstrates the fact that high speed is in itself no protection. Either the submarine was very fortunate, or she managed to time *Roxburgh's* zigzag program and accurately estimate her speed.

The divergence on this occasion, 150 yards in 300, was much too great, and had *Roxburgh* not been caught as it were in irons, both torpedoes would probably have missed. There was no conceivable point in firing at *Roxburgh's* bow. She could not possibly have been going faster than the 20 knots, which the submarine evidently allowed.

VIII.—Attack on *Artois*, Auxiliary, 9 August 1917.

At 6.18 a. m. *Artois* was attacked by a German submarine bearing about six points on the starboard bow of *Artois*. The submarine itself was not actually seen. The helm was put hard-a-port as soon as the tracks of the torpedoes were sighted, speed of the ship being 11 knots. Two torpedoes were fired and one missed just ahead and the other just astern or under the ship.

Remarks.—The submarine made a very good attack and the *Artois* was lucky to escape without being hit. The range at which the submarine fired was not known.

IX.—Attack on *Courageous*, 23 April 1917.

At 9 a. m. H. M. S. battle cruiser *Courageous* was attacked by a submarine while steaming at 25 knots. Position of the submarine at firing was on the starboard bow at a distance of 1,200 to 1,400 yards. The helm was put hard-a-port and engines to full speed. Two torpedoes were fired; one was observed to be running well, while the other was breaking surface continually. Both torpedoes missed well astern.

Remarks.—The submarine evidently underestimated the speed of *Courageous* and was at too great a distance for a good chance. The torpedo-breaking surface would have spoiled any chance there might have been of a torpedo hitting.

X.—Attack on *Terror*, 18 October 1917.

H. M. S. monitor *Terror* (8,000 tons displacement; two 15-inch and four 6-inch guns) was attacked by three German torpedo-boat

destroyers while lying at anchor at 12.25 a. m. The torpedo-boat destroyers were between the *Terror* and the land, and the night being very dark they were practically invisible. They were actually sighted close on the port bow, just before firing their torpedoes. Three torpedoes hit *Terror*, all right forward. One torpedo was lifted by the explosion of another and hit *Terror* above water. Extensive damage was caused to the fore part, but the bulges again proved their great value.

XI.—Action of 17 November 1917.

Attacks on Sixth Light Cruiser Squadron.—Between 9 and 10 a. m. seven torpedoes, fired by German light cruisers, crossed the track of the Sixth Light Cruiser Squadron. Three others had passed a considerable distance ahead before 9 a. m.

One was fired at the Sixth Light Cruiser Squadron at 9.31 a. m. from the disengaged bow, presumably from a submarine, passing 250 yards ahead of one ship.

One was fired by a torpedo-boat destroyer at 8.10 a. m. at the First Cruiser Squadron and missed, due to the latter having altered course.

The enemy light cruisers were variously stated to have been of *Stralsund*, *Graudenz*, or *Brummer* class. The enemy's bearing and range was from 20° to 80° port 10,500 to 13,000 yards from the Sixth Light Cruiser Squadron; enemy's course parallel or slightly closing; enemy's speed estimated as 25 to 27 knots, slightly less than that of the Sixth Light Cruiser Squadron.

The first torpedo was seen at about 9 a. m.; this one passed between *Cardiff* and *Calypso*, its track being at about 90° to the course of the squadron. It crossed the bows of *Ursa*, and was seen running for another 5,000 yards. Its range would appear, therefore, to have been about 15,000 yards. The last torpedo was sighted at about 10 a. m.

The tracks of the German torpedoes were clearly visible, about 6 to 8 feet broad, presenting an oily appearance, and they appear to have remained visible for several minutes.

The speed of the three torpedoes which passed close to *Cardiff* and *Ceres* was estimated by them as "about 25 knots," "under 30 knots," and "between 20 and 30 knots." The estimated distance run by the enemy torpedoes to cross the track, based on data which is necessarily vague, varied from 8,500 to 11,000 yards.

It must therefore be assumed that the later German light cruisers may carry a torpedo of at least 12,000 yards' range at a speed of 25 to 30 knots. If the conclusion based on the report of *Ursa* is correct, the range may be as much as 15,000 yards.

Attacks on First Light Cruiser Squadron by light cruisers and submarines.—Between 9.25 and 9.55 a. m. three groups of torpedoes crossed the line of the First Light Cruiser Squadron, which consisted of the *Caledon*, *Royalist*, *Inconstant*, and *Galatea*, in that order.

The first group, consisting of four torpedoes, passed between 9.25 and 9.27. These were fired by enemy light cruisers at a range of 12,000 to 14,000 yards, bearing about port 40°. Enemy were in a roughly parallel course, and their speed was estimated at 29 knots, slightly faster than that of First Light Cruiser Squadron.

Of these torpedoes one came up short, one ahead of *Caledon*, one ahead of *Royalist*, and the last passed ahead of *Inconstant*.

The next group passed between 9.30 and 9.33 a. m., and was made up of apparently five torpedoes, which crossed the line from port to starboard, fired by light cruisers, and three torpedoes, crossing from starboard to port, fired from submarines. Of these, one passed ahead of *Caledon*, three between *Caledon* and *Royalist*, two between *Royalist* and *Inconstant*, one ahead of *Galatea*, and the eighth hit *Galatea* on the starboard side, under the bridge, but did not explode.

Note.—It is not absolutely certain that this was a torpedo, but *Galatea's* remarks on this occurrence are as follows: "The shock was felt throughout the ship, the wireless operator in the auxiliary radio office being thrown off his stool. The shock was of a different description to that caused by a shell exploding in the water in the vicinity, or of a depth charge or mine exploding. No damage was done, and divers were unable to find any marks. (The ship's bottom is considerably marked by P. V's at this point.)"

The enemy light cruisers at this time were bearing between 20° and 50° port at a range of 12,000 to 15,000 yards.

Submarines were not actually sighted before this attack, but periscopes were seen by *Royalist* and *Inconstant* soon after.

The third group of torpedoes passed between 9.50 and 9.55 a. m., and consisted apparently of four torpedoes, which were all fired by submarines from the starboard side of the squadron. Again the periscopes of the submarines were sighted after the tracks of the torpedoes had been observed. These passed, one ahead of the *Caledon*, one ahead of *Inconstant*, one ahead of *Galatea*, and the fourth astern of *Galatea*.

The tracks of these torpedoes were noted as from 8 to 12 feet broad and very oily. The light cruisers were firing at extreme range, the torpedoes having 9,000 to 11,000 yards to run to cross the track. The speed of the torpedoes was estimated at about 30 knots .

Two torpedoes were observed to come up short and another was seen to break surface, then turn eight points to port, and finish its run on the surface.

XII.—Attacks by Submarines on *Princess Royal* and *Tiger* 17 and 18 November, 1917.

(*a*) *Princess Royal* was attacked by submarines between 8.40 and 8.45 a. m. on 17 November, and observed four, or possibly five, torpedoes. The enemy submarine or submarines were not sighted before the attack.

(*b*) *Princess Royal* was again attacked by submarine between 9.44 and 9.48 a. m. on 18 November. At least two submarines must have been present, but were never seen. Three torpedoes were observed.

(*c*) *Tiger* was attacked at 9.43 a. m. on 18 November. The submarine was not seen. Two torpedoes were observed.

On 17 November the First Battle Cruiser Squadron was acting in support of the light cruisers and First Cruiser Squadron. The light cruisers had previously reported sighting eight enemy submarines on the surface. The attacks took place almost immediately after a 16-point turn. The *Princess Royal* was second ship in the line. Nothing was seen before the tracks of the first two torpedoes were sighted; afterwards three separate reports of submarines were received, all on the port bow. In no case was a periscope or conning tower sighted, but merely a disturbance on the water.

The track of the third and last submarine was very distinct, bearing 20° port and crossing to starboard. *Princess Royal* tried to ram, but with no result.

On 18 November the squadron was steaming in line ahead, the *Tiger* being center ship of five. There was no destroyer screen at the time. At least two enemy submarines must have been present, but were never sighted.

The enemy attacks were well carried out, but, as usual, the tracks of the torpedoes were all very clearly visible and thus were easy to avoid.

Several of the torpedoes were observed to break surface and to be running very shallow.

NON-RECOGNITION OF UNITED STATES SUBMARINES BY FRIENDLY VESSELS.

The following two accounts of attacks made on United States submarines by friendly transports, while not of recent occurrence, are published as examples of the difficulty in recognizing friendly submarines when sighted in waters where enemy submarines may be expected.

ATTACK ON U. S. S. *N-3*.

Source: Lieut. Commander A. G. Dibrell, U. S. N., Commanding (War Diary).

23 July 1918.

At 2.55 a. m., 23 July 1918, with smooth sea, full moon, heavy weather, and poor visibility, the U. S. S. *N–3* was lying to, charging

batteries on the port engines in 39° 50′ N., 69° 56′ W. A steamer was sighted on the starboard side of the U. S. S. *N–3* in the moon's rays, distant about 800 yards. A moment later another vessel was sighted on the port quarter, distant about 200 yards, headed straight for the U. S. S. *N–3*. In the mist she could not be made out; the commanding officer of the U. S. S. *N–3*, thinking it might be a submarine making an attack on the steamer sighted to starboard, gave orders to flood the tubes and stop the charge. Less than a minute later the vessel astern was made out to be a transport not more than 100 yards away. The preliminary recognition signal (green) was immediately fired, and the recognition signal "R D" made by flashlight. The transport answered the preliminary recognition signal by one long and three short blasts on the whistle. As the recognition flash signal was made by the commanding officer he heard the order given from the bridge of the transport, "Fire." He yelled, "Don't fire; this is an American submarine," but at that moment the transport's gun fired a shell, hitting the U. S. S. *N–3* just at the water line. At the time, 2.59 a. m., the transport was not more than 50 yards away, and a great many men could be seen on deck and could be heard talking. The order to load was heard. By this time five or six men had gathered on the bridge of the transport; the men on the submarine called, "Don't fire"; "Don't shoot"; "This is the *N–3*," at the same time making the recognition signal with a blinker light. Some one on the transport asked where the submarine's flag was; it was brought up immediately and the marker buoy light and a flashlight turned on it. When the shot was fired, other ships appeared headed on different courses as though they were scattering. The commanding officer of the submarine expected to be fired upon by each transport in turn, but, as he was unable to get out from between the lines, he kept his motors running to keep broadside to them, continuing to flash the recognition signal.

At 3.10 a. m. water was coming in the torpedo compartment rather fast. The commanding officer ordered as much oil blown aft as the after tanks would hold, and all remaining in the forward fuel tanks overboard, at the same time to blow forward trimming, adjusting, and auxiliary tanks overboard and flood after trim. While these orders were being given a destroyer came in sight on the starboard quarter, not more than 200 yards away. The preliminary recognition signal was made by the submarine, which started to signal the destroyer that it had been hit and requested it to stand by until the damage could be ascertained. As soon as the destroyer saw the green rocket, it went "hard left" and headed straight for the U. S. S. *N–3*. The U. S. S. *N–3* had stern way, and as the destroyer was turning toward the *N–3* to port, she went full speed astern on both motors to avoid being rammed by the destroyer. The destroyer continued to turn towards the *N–3* in spite of the fact that the *N–3*

had her flag held between two men plainly exhibited over the marker buoy and had flashlights turned on it, the recognition signal being given, and everybody yelling that it was an American submarine. When the destroyer was about 20 yards off, the officer on the bridge was heard to order "hard right," and just as the destroyer grazed the bow of the *N–3*, "hard left." From the way smoke and flame were pouring from the stacks the commanding officer of the *N–3* took her to be going full speed and attempting to ram. The commanding officer of the *N–3* called to the destroyer as it passed that it was the *N–3* on patrol, had been fired on by the leading transport, and was shipping water forward; to stand by. It was later learned that this was the U. S. S. *Preble*, with Lieut. Mack commanding. She stood by until the leaks were stopped by caulking.

A shell was picked up in the forward superstructure of the *N–3*, which was found to be a British 7.5-inch shell, No. 13. The damage consisted of 17 rivets sheered off at the water line, frame No. 79 bent and twisted, hole in the superstructure, anchor cable cut and anchor lost, forward diving rudder rod bent, and knuckle joint sheered, torpedo-expulsion tank dented.

The torpedo compartment was flooded to the height of the combing between the forward battery compartment and torpedo compartment. This compartment was pumped by the adjusting and high-pressure ballast pumps. Two thousand eight hundred and fifty-five gallons of fuel oil were lost, blown overboard to lighten boat forward. There were no casualties.

The action of the crew was commendable. Everyone on watch remained at his station. All orders were executed immediately and there was no undue confusion or noise. Chief Gunner's Mate R. E. Day, who was flooding the tubes when the shell struck, showed initiative and good judgment in his prompt action in starting the pumps on the torpedo compartment, closing water-tight door and putting a pressure on the forward compartment to check flooding. This undoubtedly prevented the forward battery compartment from being flooded.

The commanding officer commended Electricians J. S. Fickes and E. P. Sammons for standing by the motors and for their prompt action in answering signal for "full speed astern," which prevented the U. S. S. *Preble* from cutting the U. S. S. *N–3* in two.

Comment by commanding officer.—It is not considered good policy to go on patrol unless both engines are in good condition, even under most favorable chances of intercepting an enemy submarine. Being overanxious to meet the enemy on this occasion came very near being disastrous.

It is not believed that the U. S. S. *N–3* was seen by any ship until the recognition signal was fired, although at that time the leading

transport, which fired at the U. S. S. *N–3*, was not more than 75 or 100 yards off.

U. S. S. *N–3* used all recognition signals in effect, and had the white prescribed stripes on the conning tower, but no heed was paid to them. In the first case they were answered by a 7.5-inch gun and in the second place by an attempt to ram, and it was learned from the boat that came alongside from the *Preble* that the *Preble* had a depth charge ready for the U. S. S. *N–3*.

Would it not be better to admit that no one is going to regard recognition signals and trust to being able to keep out of sight than to rest on the false assumption that your recognition signals will be understood and complied with?

There are conditions of weather (visibility) or damage to material when it is impossible to submerge before being seen. A submarine is then liable to attack from all sources. The tail clutch of the U. S. S. *N–3* had just been thrown in from the charging when the transport fired.

Officers have said that there is insufficient time when a submarine is sighted to answer signals or rely on recognition signals; that the time they have in which to fire for self-defense is measured in seconds and that all submarines must be considered hostile. Are they not too anxious to shoot at or sink anything that looks like a submarine? The accepted policy seems to be "shoot first and investigate afterwards."

ATTACK ON U. S. S. *N-5*.

Source: Lieut. Commander J. M. Creighton, U. S. N., Commanding.

11 September 1918.

While operating at sea on patrol with the U. S. S. *Charles Whittemore*, the U. S. S. *N–5* broke her towline at daylight, 6 September 1918, in a heavy gale. The U. S. S. *N–5* submerged, following the *Charles Whittemore* all day. The weather was very heavy with rain and fog. At 11.30 a. m. Lieut. Commander Creighton was relieved at the periscopes by J. E. Slattery, chief machinist's mate, the only other man on the submarine capable of directing her movements (at the time the *N–5* broke her towline her other officers were on the *Charles Whittemore*). At about 1 p. m. the commanding officer was called and informed that the *Charles Whittemore* had been lost sight of. Full speed ahead was immediately ordered until she was picked up again, when the watch was turned over to a chief machinist's mate.

At this time it was noticed that the water in the bilges was at such a height that pumping was ordered at once. The boat was rolling very heavily, frequently 36° on each side, although she was at periscope depth. At about 3 p. m. the water in the bilges had washed up into the port main motors, grounding them. All other opera-

tions were stopped to get the bilges pumped. Since the order to pump had been given every effort had been made with main pumps, hand pumps, and a portable hand pump to get the water out of the bilges but no success had followed these efforts (the adjusting pump had broken the day before and was not in the boat). As there was no room in this vessel to get a bucket or even a dipper in the bilges for bailing, they were finally bailed out in a very heavy sea by two men with condensed milk cans.

Previous to this day the gyro compass repeaters had been short-circuited at the switchboards, and the radio was not capable either of sending or receiving any messages. In view of these conditions, and the fact that no pumps in the boat would operate, it was considered necessary to return to port as soon as possible. An effort was made to start the engines with the batteries in series, but in every case as soon as the lead came on the motors all the lights on the boat went out, and the motors sparked very heavily and stopped. Then, as a last resort, the engine clutches were put in, and an attempt was made to start the engines with the motor turning over at slow speed, batteries in parallel. The port engine was finally started, and the U. S. S. *N–5* ran down the wind towards the *Charles Whittemore*, who was firing Very's stars to show her position. In view of the conditions aboard, U. S. S. *N–5* requested permission to proceed to port, and asked the course and distance to Nantucket Lightship. The execution of signaling was made very difficult, due to the high seas, but permission to proceed to the submarine base, New London, was finally received, and the answer for the course to Nantucket Lightship was returned as 244°. At 9 p. m. U. S. S. *N–5* set this course and started back.

The position of U. S. S. *N–5* at this time was known only very vaguely, but it seemed that the best thing would be to try to reach Nantucket Lightship by daylight. Having arrived here, it was planned to stay at the lightship, asking her to radio the commandant second naval district to send a convoy to accompany U. S. S. *N–5* home. There was no opportunity on the morning of the 7th to get any star sights, and at the first opportunity a sun sight was gotten when it was 12° high, and another when it was 21° high, just before it disappeared in the clouds. Though these sights could not be very valuable, they were all that was available, and it was assumed that the course given by the tender would put the *N–5* somewhere in the vicinity of Nantucket Lightship. Latitude 20 miles south of this was assumed, and both sights gave a longitude 10 miles east of Nantucket Lightship. The intersection of two Marcq St. Hilaire lines gave a point about 30 miles 144° from Nantucket Light. At 7 a. m *N–5* succeeded in starting the other engine with batteries in parallel, and at 8 a. m., after having turned to course 295° for Nantucket Light, the smoke from about 15 stacks over the horizon to the

south was sighted. U. S. S. *N–5* immediately turned north, and this smoke disappeared at 8.10. This sighting of an apparently eastbound convoy to the south was a further conviction of the opinion that the *N–5* was north of the steamer lanes and probably very near Nantucket Light. The course was again made 295°, and it was expected to find the lightship on the port bow at about 10.30. The sun disappeared in the clouds after the two sights, a mist settled on the water, and no further sights could be obtained. Nothing was sighted at about 10.30, but about 11.30, two points on the port bow, something was seen to begin to come out of the mist. It was decided that this was the lightship, and U. S. S. *N–5* headed for it. At this time it was misty and the sky was obscured, and U. S. S. *N–5* suddenly became aware that the object toward which she was heading was a large camouflaged ship about 5 miles away.

It was known that the first maneuver should be to disappear from view as promptly as possible, and as the *N–5* had full speed on both engines and had just seen her, the quickest manner of disappearing seemed to be to turn away and get into the mist. This quick decision was backed by a realization that the batteries were almost completely exhausted by the previous day's run, there was very little air in the tanks, none of the pumps were working, and the motors could only be used at slow speed.

Immediately after *N–5* turned, however, a flash and a report came from the ship, which could then be seen coming out of the mist with 8 or 10 more vessels, all headed east. Both engines were immediately stopped, and *N–5* turned so that the ship was on the starboard beam and could see the bridge and flag signals, and then lay dead in the water with about 10 men on deck. The colors were flying at rear of cutwater in the regular position inverted to show ship in distress. Another set was being waved by a man on the periscope housing, and J. E. Slattery, chief machinist's mate, continued to wave the meal pennant, the submarine recognition signal of the day. The bridge signals were on both sides of the conning tower and the deck was marked.

As the ship advanced she fired about 15 shells from bow and stern guns, and continued firing to within 2,000 yards. Seeing that she would not cease firing, a white blanket was hoisted and waved, and two sets of colors were held out plainly for them to see. The ship began signaling on the shutter searchlight, and had a four-flag hoist at the starboard yardarm; neither of these corresponded with the recognition signals of the *N–5*, which were made repeatedly. The allied recognition signals received on leaving port expired 1 September and the *N–5* had nothing to take their place. One man, with a clear background, continued sending "U. S. S. *N–5* in distress," but when the ship was about 1,000 yards away, she fired six rounds of shrapnel, all of which went about 50 yards short. The *N–5* lay dead during all

this, signaling by every means available, and she finally ceased firing as she passed astern about 500 yards away. She was a transport, but flew no national flag, and all hands were on her decks in life preservers. She signaled by semaphore: "We will report you by radio." Foreseeing that this would lead to a patrol boat being sent out from Newport, the *N–5* signaled to her: "I am proceeding to Block Island." She acknowledged this, and returned to the convoy. The *N–5* prepared to go ahead, but sighting more smoke, trimmed down in spite of grounded motors, low batteries and water in the bilges, and no pumps of any kind available; time, 1 p. m. Just before trimming down, several ex-meridian sights were gotten at about 10 minutes after noon, and from this the latitude was ascertained as 39–39 north. The noon longitude from the D. R. by morning sights was 69–52 west. A Marcq St. Hilaire was worked for this noon sight and a position point of 39–35 north found.

Came to the surface at 4.30 p. m., and after starting both engines headed south, bailing the bilges with the small tins. All hands were ordered aft to get the water into the afterpart of the motor room and away from the motors, and finally succeeded after several hours' work in getting the bilges in the motor room fairly dry. A great deal of water was in the engine-room bilges also, but the only way to remove it was to drain it aft into the motor-room bilges and bail it out. This was going to be such a tedious job that the drainpipe connecting the engine room and the motor room was closed and the water held in the engine-room bilges. At 6.45 p. m., being then in a position latitude 39–20 north, longitude 70–10 west, the compass course was made 270° true. A hazy sight of Polaris gave latitude 39–18. It was planned to run west to longitude 71–15, which should have been reached at about 2 a. m., and then change course to Block Island, diving at daylight and staying down all day of the 8th and running to Block Island during that night. There was about 300 gallons of lubricating oil aboard, and at about midnight the chief machinist's mate on watch, while blowing this oil from C–4 to the sump tank, blew 175 gallons of it into the bilges. At this time it seemed that the paramount necessity was to get to port in the shortest possible time, and a course was immediately laid from a very hazy position to Block Island and proceeded on both engines. At daylight found Montauk Point Light, bearing 30° true, and rounding Montauk Point made way into Great Salt Pond, Block Island.

Previous instances of non-recognition of allied submarines by allied armed ships have been published in the O. N. I. publications, as follows:

O. N. I. Compilation No. 6, 1918, page 13.—"Encounter of U. S. S. *Nahma* with the Italian submarine *H–6*."

O. N. I. Compilation No. 7, 1918, page 11.—"Attack by U. S. S. *Davis*, *Paulding*, and *Trippe* on British submarine *L–2*."

O. N. I. Compilation No. 8, 1918, page 47.—"Recognition of U. S. S. *AL–10* by U. S. S. *Trippe*."

O. N. I. Compilation No. 11, 1918, page 21.—"Non-recognition between destroyer and U. S. S. *AL–3*."

O. N. I. Compilation No. 13, 1918, page 64.—"Non-recognition between British sloop and U. S. S. *AL–11*."

O. N. I. Compilation No. 13, 1918, page 68.—"Non-recognition between two merchant ships and U. S. S. *AL–4*."

COMMUNICATIONS.

COMMUNICATIONS IN THE BRITISH NAVY.

Source: Navigating Officers, Battleship Division Nine. **January 1919.**

(11074)

Visual Signal Flags.

The British use the International Code flags, but have assigned other than the International Code letters to them. They also have a set of numeral flags and pennants and a number of special pennants.

The foundation of the British flag system is that all maneuvering signals, speed signals, and as many others as possible shall be self-evident. This is thought to be a most excellent scheme, as it is not necessary to refer to a signal book when a tactical signal is hoisted to know exactly what to do. Chances of mistakes are also materially lessened and signals can be obeyed more quickly.

The British also use numeral pennants for call flags instead of the red, blue, and yellow flags used in the United States Navy. All the pennants are distinctive and can be made out more easily; and there are only 10 to learn, instead of 26, which makes it easier for the officer of the deck to keep a general eye on the signal bridge, and see that they answer properly both at sea and in port.

Searchlights and Flashing Lamps.

The British have a 24-inch searchlight for signaling purposes only and small hand-flashing lamps; also Aldis lamps for fire-control work. All of the searchlights and lamps are efficient and work well. The hand-flashing lamp is portable and has a switch by which the brilliancy can either be increased or dimmed, depending on the distance of the receiving ship. It is much superior to the old blinker tube of the United States Navy.

Miscellaneous.

Whenever a general signal is sent out the British system requires each ship to acknowledge the receipt of it to its division flagship. When all ships in a division have acknowledged, the division flagship acknowledges to the squadron flagship, who in turn acknowledges to the commander-in-chief or senior officer present, and in this way the commander-in-chief is assured that every ship has received the signal.

During the time of use by Battleship Division Nine, United States Atlantic Fleet, of the British system of designating visual signals, i. e., by the "time group" method, 0000 and 2400 daily, the following good features of the system have been brought out:

(*a*) Time of origin of the signal, or time of starting from the originating ship, is shown. The United States Navy system of serial numbers does not show the origin or starting time, which is particularly desirable in the case of relayed or "P. D. L." signals.

(*b*) A method is presented of designating unofficial or "private" signals. In the United States Navy system no serial numbers are given unofficial messages. Therefore in referring to an unofficial signal it virtually has to be repeated.

(*c*) The form of the signal itself always shows whether it is official or unofficial. As a precaution, however, the letters "UN" could be placed in the preamble of every unofficial signal, and a time of origin appended.

(*d*) When the "time group" system is adopted, the method of designating signals then becomes uniform for both visual and radio. Such uniformity is desirable so far as communications are concerned in that filing is simplified.

There are about 25 signal ratings on battleships, of which four or five are signal yeomen who have had a special course in signals at signal schools on shore. One of these men is always on the bridge with the officer of the deck under way to read and interpret signals for him.

RADIO.

General Scheme.

Each class is assigned a certain wave, which must be kept guarded at all times. Thus the battleships listen out on 1,000 meters, the destroyers on 600. Whenever the commander-in-chief wishes to issue a general signal by radio it is sent on the wave or waves of the class or classes of ship addressed. In addition all ships above destroyers have an auxiliary set and listen out on that for interfleet work. The main station is fitted with a dual reception and double watch is kept, one man listening in at all times on the admiral's wave and other listening on the various shore station waves at the routine times. The system of calling tunes and working tunes is not used. Of the two it is thought that the British is the better.

Handling Traffic.

Under the British system there are three principal ways by which a message may be sent to a ship:

(*a*) *Direct Method.*

(*b*) *Blind Method.*

(*c*) *"I" (Interception) Method.*

(*a*) In the *Direct Method* the transmitting ship or shore station addresses the actual receiving ship or station and obtains answers from it. This method is the quickest and leaves no doubt in the mind of the originator as to whether or not messages have been received by the addressee. On the other hand, it forces both the transmitting and the receiving ships to use their transmitting gear and employ their own call signs, thereby giving the enemy an idea as to the forces at sea. There is also the risk of the enemy's fixing the position of the ships by means of his direction-finding apparatus.

(*b*) In the *Blind Method* the transmitting ship or station addresses the receiving ship, but sends the message "into the air"; that is, no answer is made by the addressee, unless she is ordered to acknowledge receipt at end of message, in which case she later calls and acknowledges receipt to station from which message was sent. She may be ordered not to answer by the letter "F," which is transmitted in the heading of the message, or she may be addressed by a collective call sign such as "any British battleship". This method gives the originator no assurance that the message had been properly received by the addressee, but if care is exercised in coding the message and sufficient power is used in its transmissions, the chances of its not reaching its destination are very small. The ships' operators are trained to expect such messages and to keep alert and copy signals which they know are coming through but once, and on which they realize that there is no chance of getting a repetition of missed groups. There is no chance of the enemy's fixing the position of the receiving ship since she does not use her transmitting gear until later, if at all.

(*c*) In the *"I" (Interception) Method* the message is transmitted from one shore station to another. The receiving station may be ordered by the transmitting station to repeat back the message if it is particularly important or if operation is difficult. The receiving station asks for a repetition of any groups which may have been missed and she also decodes the message (unless it is in a secret cipher which she does not possess), and if there are any obvious mistakes in coding she asks to have the wrong groups checked and repeated. In the heading or text of messages sent by this method are call signs or indicating groups which show for what ship the message is intended. This ship reads the message as it is being sent between the shore stations.

As shore stations are a great distance apart it is reasonably certain that the intercepting ship can read the message if interference at sea is much less than on land. In many cases, also, the intercepting ship gets the benefit of repetitions made by the shore stations. If the message is particularly important it may be transmitted between a second set of shore stations so that the intercepting ship has a second chance to read it. Using this method, faults in coding and transmitting are sure to be corrected and, as in the case of the blind method, the intercepting ship for whom the message is intended does not betray her position, since her transmitting gear is not used. This is another instance in which the operator in the intercepting ship must be alert and must not count on being "awakened" by being addressed by his own call sign.

The *"I" Method* is used very extensively, and for the purpose of regular communication to ships by this means certain ships and shore radio stations are organized into groups. Each group consists of two or more stations, one of which is termed "Master station." All stations of each group work on the same wave, the group being designated by the number of hundreds of meters in the wave employed. That is, group 22 uses a wave length of 2,200 meters As mentioned above, certain important messages may be sent from two or more groups. In order to indicate to the ships when and on what wave length to expect a repetition of a faulty message, a three letter indicating group is added before the text of the message. This shows over what "route" the message is to be sent.

Dummy Messages.

One object of the dummy message is to keep the volume of traffic from shore stations fairly constant, whether or not the fleet is at sea. If it were not for such messages there would be a sudden burst of messages from the shore stations when an emergency arose, and the enemy could tell that something unusual was taking place.

The British have an "after action" set that can be set up anywhere and has a range of about 100 miles. It is thought that something of the sort should be provided for United States ships.

There are also the type 31 fire-control sets and the wireless phones which have been installed on United States ships and which have proved highly satisfactory.

Antenna.

The British use the sausage type of antenna, which it is thought has the following advantages over the flat top in use in the United States Navy:

(*a*) Weighs a little over a quarter as much as the flat top.

(*b*) Is much stronger, as a phosphor bronze messenger wire can be run through the center, increasing the strength about fourfold.

(*c*) Single wires may be cut by splinters without bringing the entire antenna down or grounding it. The last is accomplished by placing spreaders about every 5 feet.

(*d*) Occupies far less space than the flat top, and spare sections can be made up and stowed with greater ease.

The disadvantages are:

Decreased efficiency in radiating and receiving qualities. This does not amount to much in the case of the British, as they have comparatively short distances over which to send, while in the United States Navy it may be the governing factor.

The British scheme of providing a separate, metallic, continuous trunk for each rat-tail is excellent and should be adopted. The American method of using a wire screen is a detriment rather than a help, as the screen acts as a catch for all dirt, and moisture penetrates the screen and causes insulation leaks.

Arrangements of Radio Rooms—Handling Messages, etc.

The coding office is the central point in the communication system between the different radio rooms. The methods of communication are given in the following table:

TABLE SHOWING THE MEANS OF COMMUNICATION BETWEEN THE CODING OFFICE AND VARIOUS STATIONS.

Coding office to main radio	Message, tube, and buzzer.
Coding office to auxiliary radio	Pneumatic tube and buzzer.
Coding office to arc radio	Pneumatic tube, buzzer, voice tube, and ship's telephone.
Coding office to communication office	Pneumatic tube, voice tube, and ship's telephone.
Coding office to bridge	Pneumatic tube, voice tube, buzzer, and ship's telephone.
Coding office to conning tower	Pneumatic tube, voice tube, JX phone, ship's telephone, and buzzer.

There is one buzzer circuit connecting main radio and coding office, and another connecting main radio, coding office, auxiliary radio, conning tower, and bridge. The bridge buzzer is of the loud-sounding type. The fire-control set has a remote control station in the plotting room, and normally the radio operator in this room does all the sending and receiving. He reports the signals to the plotting-room officer verbally. The operator in the fire-control radio room keeps the set in tune and shifts to the different wave lengths as required. He also copies the incoming signals, and should the plotting-room operator miss them, due to noise in that room, he can get them by voice tube from the other operator. The fire-control radio room has communication with the plotting room only, since from the latter station the information can be distributed as required.

Handling of Messages.

There are two classes of messages, (*a*) urgent signals, i. e., maneuvering signals and enemy reports, and (*b*) routine messages. Maneuvering signals are sent by radio when visual communication is impossible, due to a fog, or when it is impracticable, due to the distance between ships or the number of ships involved. The radio signals are virtually flag hoists, coded if necessary for secrecy, and should reach the signal bridge without a moment's delay. This is accomplished by having the radio operator send the signal to the bridge by buzzer exactly in the form in which it is received. Two copies of this signal are also sent to the coding office by pneumatic tube, the decoder sending one copy directly to the bridge, as a check on the buzzer communication to the bridge; and the other copy is decoded and also sent to the bridge by pneumatic tube and handled in the same way as maneuvering signals.

Routine messages are sent from the radio room to the coding office by tube, and after being decoded are sent to the bridge by pneumatic tube. When at general quarters decoded messages are also sent to the conning tower by pneumatic tube.

When in harbor messages are sent from the decoding office to the communication office by pneumatic tube and are distributed by this office.

Radio Guard Ships.

The British have a system worked out so that in port ships are detailed to guard the various waves that may be used, each wave being continuously guarded, each ship taking one wave. All messages received on her wave by any guard ship are passed to the commander-in-chief either by visual or auxiliary. In this manner the commander-in-chief is sure that he will get every message that comes through. When the fleet is ordered to sea each division is ordered to take up a certain radio organization which provides for the same thing. In all cases guard ships listen out on the admiral's wave in addition to the wave they have been ordered to guard. In some cases, on the important waves, a stand-by guard is also detailed, both at sea and in port.

British System of Training Radio Men.

In the British Navy training in radio begins with boy yeomen. They are sent to a training school, where they are taught to send and receive. They are also instructed in the fundamentals of radio apparatus and they learn semaphore and the meanings of the flags. This instruction lasts for six weeks in war times and three months in peace routine. If qualified, the boy seaman then becomes a boy telegraphist, and after nine months at sea (or longer if necessary to attain the age 18) he is eligible to become an ordinary telegraphist.

After 12 months in peace times he is eligible to be rated telegraphist. A telegraphist must have 18 months' to 2 years' experience at sea to become a leading telegraphist, and must have a good knowledge of the gear. Such a rating is often put in charge of a destroyer or even a light cruiser.

After serving as leading telegraphist for two years the man is sent to school for three months, and he is then eligible for petty officer telegraphist. This rate is on a par with the United States Navy radio electrician first class. A petty officer telegraphist must requalify in his rating every three years. Six or seven year's service as petty officer is required to qualify as chief petty officer telegraphist. However, after serving a year as petty officer telegraphist he can be made a warrant officer or mate if there is a vacancy and if he has the proper recommendations and a good record. If made a mate, he is sent to a college for a year's instruction in naval subjects.

Operators on watch are exercised daily at one of the various W/T exercises prescribed by the commander-in-chief. Also when the fleet goes out for maneuvers it is exercised in the radio tube procedure. It is thought that this exercise is invaluable for the ships and absolutely necessary, as mistakes are even now being made after four years of constant drill.

Communications, Codes, and Ciphers.

On a first-line ship the radio decoding complement consists of enlisted men working two in a watch, watches being maintained continuously. These men are in training for radio operators, it being required that an operator be familiar with codes as well as procedure.

All decoding of radio messages is done in a room with adequate interior communication by voice tubes, telephone, buzzers, and pneumatic tubes. All decoding of visual messages received in code is done in this room, and messages are not sent to radio room for decoding. Cipher messages are, however, sent down to the officer having duty as coding officer.

Codes and Ciphers.

The British system also requires that an officer be detailed to handle all codes and ciphers in so far as it concerns their receipt from the disbursing authority, custody when not in use, cancellation, destruction, and correction. Regardless of the confusion, delay, and inconvenience of incorrect codes and ciphers, it is absolutely dangerous to the safety of a ship not to receive a correct and complete version of all messages in time of war. Incidentally, by centralizing this responsibility the confidential nature of the code or cipher is assured in so far as it applies to a code or cipher being compromised through loss or misuse.

All codes are confidential and all ciphers are secret unless otherwise listed. The former are handled by enlisted men as decoders and the latter by decoding officers, who form a board known as the decoding board.

As a precautionary measure, and also as one of greater or less necessity, all codes and ciphers are changed frequently, the former more frequently than the latter on account of more constant use. Some codes are changed periodically every two weeks while all would average about once a month.

When it is considered that on an average of 200 or more messages are received each day in code, it would be impracticable to have all codes designated secret handled only by officers; many of the American so-called secret codes and books could just as well be handled by enlisted men, of course under proper supervision and care. As an example, there were in the decoding room of a United States battleship 15 British codes to which the decoder had access, and in addition other books, such as call signs, which were of an extremely confidential nature. Certain parts of the general signal book which might be of use are embodied in an appendix which is changed about once a month.

AVIATION.

AVIATION—TEST OF RADIO TRANSMITTER.

Source: Weekly Report 76, Naval Aviation.

22 January 1919.

In order to test the new radio transmitter, CG 1130 type, seaplane 3560, F–5–L, was flown from Hampton Roads to Washington and return. An officer of the Bureau of Steam Engineering, sitting at his desk, was connected over his desk telephone to the Arlington Station. He was in communication with the plane during the greater part of its trip, and when the plane was about 10 miles from Anacostia was asked if it was safe to land. He informed the pilot by radio telephone that the ice had gone out of the river and that he could land without difficulty, but to be sure and go to a mooring, as the runways were crowded. On the return trip, the pilot notified this station that he could land in about four minutes and requested that a motor sailor be sent out to meet him. This message was relayed by telephone and the motor sailor was actually on its way to assist the plane when it landed.

RADIO EXPERIMENTS—NAVAL AIR STATION, HAMPTON ROADS, VA.

Source: Weekly Report 77, Naval Aviation.

3 February 1919.

One of the F–5–L experimental seaplanes, which was equipped with a radio compass coil built into the tail of the machine, received signals at Hampton Roads from Swan Island and also from New Orleans. This is the longest distance-radio receiving record for seaplanes brought to the attention of this station.

Every effort is being made to develop radio installation on seaplanes to the point where they can be of practical use to the pilot, especially in times of emergency. The emergency antenna, carried on a collapsible mast which can be erected in a very few minutes on a seaplane of the H-16 type, was tried out this week. Communication by telephone was successfully carried on between the station and the plane, which was 15 miles away.

COMPARISON OF BRITISH AND AMERICAN WIRELESS TELEPHONES.

Source: Office of Director of Naval Communications.

26 January 1919.

An eminent American engineer of the Western Electric Co. recently visited England to investigate wireless telephones of the Royal Air Force and to make comparative tests with American instruments. After numerous flight tests he declared that British telephones are far in advance of those in use in the American air force. Pilots can speak to the ground commanders and to one another at a distance of 15 miles, and the only difficulty in communicating between machines or with the ground at greater distances arises in the consideration of weight of larger instruments.

WIRELESS TELEPHONE TESTS—PENSACOLA, FLA., AND CAPE MAY, N. J., NAVAL AIR STATIONS.

Source: Weekly Report 76, Naval Aviation.

27 January 1919.

Dirigible *E–1*, equipped with a radio telephone, type CG 1104, carried on successful telephonic communication with a ground station at Pensacola, Fla., during several short flights. Special equipment is being installed at the ground station with a view of maintaining communication up to 75 or 100 miles.

The three type *H–16* planes that will accompany the fleet to Guantanamo are being equipped with radio transmitters and receivers as well as Aldis signal lamps.

Radio tests have been quite successful in the new U-type dirigible *C–3*. The wireless telephones installed in this ship have given a remarkable advantage in the handling of the dirigible. A branch radio office has been constructed on the dirigible field at Cape May, N. J., with a loud-speaking attachment, which permits of communication between dirigible and the field officers. The radio observer notifies the field officer when the ship is preparing to land. He in turn notifies the officer of the day, who sends all available men over the field to receive the ship. The wireless station in Atlantic City, 38 miles via air line from Cape May, also has a set for transmitting and receiving radio telephones, and frequently the operator there has heard the communication between this station and the dirigible when the ship was but a short distance from the hangar.

H. S. seaplane pilots have been required to send in their positions by radio when on patrol; two pilots are generally sent out in one boat, which enables one to practice gunnery and radio while the other pilots.

EXPERIMENTS IN DETECTION OF SUBMARINES—NAVAL AIR STATION, KEY WEST, FLA.

Source: Weekly Report 77, Naval Aviation.

3 February 1919.

In the course of experimental maneuvers carried out at the naval air station, Key West, Fla., for the purpose of detecting submarines, they were readily spotted and could be traced to a depth of 60 feet. Radio communications were carried on from the *C–1* surface craft and shore stations to a distance of 20 miles and radio telephone conversations carried on between two dirigibles. To mark the location of submarines, small spotting bombs and calcium carbide bombs were dropped with accuracy, enabling the patrol craft to follow up the submarines rapidly even when completely submerged.

ZEPPELIN HANGAR—MAUBEUGE, FRANCE.

Source: Lieut. Commander J. P. Norfleet, U. S. N.

13 December 1918.

(11152)

When the French evacuated Maubeuge in September, 1914, they left standing a dirigible hangar which had been built to accommodate the 23,000 cubic meter ship and future French rigids that might be built. This hangar was about 650 feet long by 135 feet wide, with

an over-all height of about 110 feet. When the Germans occupied Northern France they wished to use this hangar for Zeppelins, and to accomplish this purpose lengthened it by about 100 feet, making the total length of the hangar 750 feet.

A visit was paid to Maubeuge for the purpose of inspecting this hangar and of seeing if possible what methods the Germans had for handling large rigid ships on the ground. An inspection of the landing field revealed that they left no evidence of any special features used in connection with getting ships in and out of the hangar, except two railroad tracks that ran into the hangar, which might or might not have been used in connection with the handling of the ships. There are no other features that are not common to French methods, except that there were no *avant-ports* or wind screens. The field is by no means an ideal one for landing a large ship, and difficulty must have been experienced in handling a Zeppelin there unless there were contrivances which the Germans removed before evacuating.

The hangar itself is built of steel with supporting walls of brick. Twenty-eight steel girders on either side form an arch of nearly semicircular shape at the top, the upper covering of the hangar being of sheet iron. Windows are in the side and top of building. The whole interior of this hangar is remarkably free from any obstructions or loose gear of any kind. All hydrogen lines, valves, etc., are below the level of the deck; railroad tracks are flush with the deck; and there is nothing on the sides of the walls that projects out at all into the open space in the hangar. The doors are about 100 feet high in the clear, and operated by hand, there being four sections to close the one open end of the hangar.

Before evacuating Maubeuge the Germans removed all machinery of every description from this air station, including workshops, hydrogen plant, etc., leaving only a gasometer and the hangar intact. Several buildings were not destroyed, but their contents were taken away. No evidence was obtainable as to the amount of use that the Germans made of this station as the inhabitants apparently had little information of exact value as to how often Zeppelins were actually stowed in Maubeuge or how often they were flown from this hangar. The French system of pulley rails extended for 300 yards in front of the hangar.

For inspecting the top of the dirigible three runways are suspended on the roof of the hangar, access to which is obtained by a narrow staircase on the side. Provision is also made for ventilation through the top of the building by a skylight arrangement extending for about 600 feet along the center line. This also furnishes light, in addition to the windows on the sides.

The principal object of this visit was to discover if the Germans had left any traces of the arrangements by which they handle large

Zeppelins on the ground, in bringing them in or out of the hangars. No information of this kind was obtainable, and it would seem that Zeppelins operated from this base were to a large extent handled by hand, though use was probably made of the French system of pulley rails and of the railroad tracks which were run into the hangar on either side.

It has been shown quite conclusively in the recent flying of dirigibles on the French coast that a dirigible can be flown in practically any weather when it is practicable to fly seaplanes, provided their landing fields are properly fitted for handling the ships under adverse conditions. This at the present time is a great problem in handling rigid airships, and the efficiency of this type of aircraft will largely depend on a solution of the difficulties arising from getting the ship in and out of the hangar in abnormal winds. The fact that a rigid airship of a modern type is capable of remaining at sea from four to five days, and has a cruising radius of about 4,000 miles, renders this type of aircraft of enormous importance in fleet work and scouting operations. It is therefore necessary that much thought be given to the question of ground handling of large airships, for they can be flown in the air under practically any conditions of fog, rain, or winds up to 40 miles per hour. Such winds are rare in the United States and can generally be forecasted in time sufficient to get ships safely into their sheds. It is therefore recommended that further efforts be made to obtain all the information possible on advanced methods of handling rigid airships on the ground.

LOSS OF UNITED STATES DIRIGIBLE *A–5257.*

Source: Weekly Report 76, Naval Aviation.

20 January 1919.

On Tuesday, 14 January, dirigible *A–5257* left its hangar at Chatham, Mass., for a test flight. Just after being released the motor cut out and the dirigible drifted rapidly to sea with a 25-mile breeze from the southwest. The pilot immediately valved and the crew jumped when passing over Nauset Beach, a strip of land barely 300 yards wide, separating Pleasant Bay from the sea. All landed without injury, although the pilot, Lieut. (j. g.) W. B. Griffin, U. S. N. R. F., jumped from a height of 50 feet. The dirigible immediately rose to an altitude of 4,000 feet, and when last seen by seaplanes 30 miles east by north of Chatham was drifting rapidly to sea. The district was immediately notified and S. C. boats were dispatched to locate and salvage the dirigible. To date it has not been found and an extensive search is still being carried on.

AVIATION—EXPERIMENT IN PICKING UP LOAD WHILE IN FLIGHT.

Source: Weekly Report 76, Naval Aviation.

22 January, 1919.

A burden weighing 60 pounds was picked up by an *H–16* seaplane while in flight and actually placed aboard the seaplane. Two sacks containing excelsior were placed, one in each of two rowboats, anchored about 50 feet apart. A rope connected the two sacks, passed over short masts, and bridged the space between the rowboats. The seaplane was equipped with a drum, on which was wound a rubber rope having a small four-pronged grappling hook at its end. After the plane was taken from the water the grappling hook was lowered and the plane maintained at such an altitude that the hook was just touching the water. On the fourth attempt the connecting cable between the two bags was successfully engaged with the grappling hook, the engines opened wide, and the bags were taken off the water. The cable was then wound up on the drum and the bags taken into the seaplane. This experiment was made in order to determine the possibility of picking up mail while in motion and is an attempt to apply the method employed by fast mail trains to pick up mail from way stations without stopping.

USE OF SEAPLANES IN COMBATTING EPIDEMICS.

Source: Weekly Report 77, Naval Aviation.

3 February 1919.

On 20 January an emergency trip in seaplane *HS–2*, No. 2235, was made from Hampton Roads, Va., to Manteo in response to a request from the senior medical officer at that naval base to send a doctor and medical supplies as a relief for a serious influenza epidemic which had developed in that locality and where there was great insufficiency of medical aid. The trip, ordinarily requiring about 12 hours by rail and boat, was made in an hour and thirty minutes and supplies distributed and the plane used to convey the doctors to such districts or small Coast Guard settlements as had practically no communication except by motor boat. The value of seaplanes in such emergencies was, therefore, very practically demonstrated.

AIRPLANE FABRICS.

Source: Bureau of Standards.

21 January 1919.

(9802)

Final tests have been conducted on a special airplane fabric of a new design just originated at the bureau, weighing about an ounce per square yard less than the standard linen and cotton fabrics.

The new material has very much less than the normal amount of warp. In the test it remained on the slip-stream section of a wing after the starting of a tear for 83 minutes in the propeller wash, whereas the standard linen lasted but two minutes. As a result of these tests, specifications have been formulated covering the production of this fabric.

A practicable instrument for measuring the tautness of wing coverings has been designed by a member of the staff and one instrument constructed in the shop. Its operation is entirely satisfactory and it is believed that it will fulfill an important need respecting the uniform and standardized application of airplane wing coverings.

ENGINEERING.

COMPARISON OF ENGINEERING CONDITIONS IN UNITED STATES AND GRAND FLEETS.

Source: Engineer Officer, U. S. S. *Arkansas*.

January 1919.

(11074.)

There are two subdivisions to consider—(*a*) *Upkeep*, (*b*) *Operation*.

Under *Upkeep* it is found that a distinct difference exists. In our service the manufacturing facilities aboard ship are developed to the highest possible degree. Shops are utilized for casting, machining, acetylene welding, forging, and woodworking. A broken part, whether it comes under one department or another, is replaced by manufacture aboard. In this manufacture several departments are often involved, but it is customary to make everything except large items beyond the capacity of the installation. In the British service the upkeep is carried on by a liberal allowance of spares. Broken parts are renewed with spares from stores carried aboard or at a base, and the spare stock is replenished by demand of the dockyard. Of course the British ships do use their shops, but not to the extent customary on our ships. It is not believed that their ships are allowed to run down any more than ours, but the method of keeping them up is different. In one case renewals are made by manufacture aboard ship, in the other from spares on hand.

Another difference in upkeep is in the matter of dockyard work. Owing to the fact that during the war the dockyard period is the only one in which it is possible to spare men for necessary leave, it is the custom to turn the ship over to the dockyard for repairs and release the ship's force for leave. The fact that the ship's mechanics are not accustomed to doing manufactured work aboard ship makes it less necessary for them to remain and assist. All the big work,

then, is done by the dockyard employees. The average period is about two or three weeks. When a ship requires extensive refit it is customary to pay off and turn her over to the dockyard completely. A few shipkeepers remain, but the officers and crew are detached to other duty and the ship recommissioned afresh on completion. It is obvious in the light of our own experience in the days of overhaul with reduced complements that this practice is bad. Many officers have agreed on this point.

In general, the differences with regard to upkeep are, first, that more spare parts are used and less manufacturing is done, and, second, that the yard force does more and the ship's force less than in our service. It is believed that their upkeep is equal to ours so far as results are concerned, but that our method is superior in that better training is obtained, we are better able to meet emergencies, and are more nearly self-sustaining away from a base.

In the matter of *Operation* the outstanding feature is the difference in the amount of fuel burned in port. This is not due to superior economy on the part of the British ships, but to the fact that much less work is required of them. In port the two large items of expenditure are those for distillation of sea water and the generation of power. The British ships not only use a great deal less water for ship's purposes than do our ships, but also utilize the waste heat of the exhaust for distilling water. Whereas we have a liberal water distribution in the interests of contentment, they restrict the water expenditure a good deal. Since, however, some of our ships are distilling water from the heat of the exhaust steam, and are making plenty of it, there is not such a great difference in the expenditure of these and British ships.

The remaining discrepancy is made up by the generation of power and use of steam for heating purposes. British ships are notoriously cold; too much so for the comfort of men brought up in American homes. They are likewise poorly ventilated by comparison with our standards. They do not go in for laundries and other labor-saving appliances, such as motor-driven dough mixers, potato peelers, etc., nor do they use as much power for workshops or turrets. Where we drill full main battery daily, it is customary with them to do so once a week. All these things and others too numerous to mention reduce the generator loads by the amount of power necessary to run the fan and other motors. This reduces the coal expenditure correspondingly.

Now, whereas the average British sailor is not used to these refinements at home and does not miss them, our men are so accustomed to them that their removal would work a serious hardship and militate against efficiency. The superior British economy in port, then, is not due to better engineering practice but to conditions outside the engineer's department which are matters of policy.

In the matter of operating at sea our ships have been fully as satisfactory as theirs in so far as maintaining speed is concerned. The fact that our ships have been able to maintain a standard speed one-half a knot in excess of their contract speed, thus requiring at least a knot in excess of this speed for ships other than the flagship, is a good indication of the personnel, matériel, and design. The one point emphasized is the necessity for the further development of the use of the auxiliary exhaust. Since operating with the Grand Fleet the U. S. S. *Arkansas* has been able to distill enough water to permit its unrestricted use by all hands and to heat the ship, using the exhaust alone. Properly designed evaporators to be operated in multiple effect would permit even a greater freedom in the matter of water without additional cost in fuel, and this subject should be investigated on ships which at present are unable to meet the demands on the exhaust alone.

In general, the ships of the two services are much alike in so far as results are concerned, being well kept up and well operated in both services. The differences come in matters determined more by policy than anything else. Ships designed to operate from a base are not as self-sustaining as those whose duties involve operation away from a base. Ships operated with fewer comforts do so because of national characteristics which affect morale. In the matter of general all-around engineering efficiency there seems to be little to choose.

Under the head of *Personnel* there is one important difference to be noted, namely, that the British ships are all operated by officers restricted to engineering duty only, whereas ours are not. It is difficult for them to understand our lack of specialization, yet they all agree that our system is quite as successful as theirs. In fact, there could be no better justification of our amalgamation than the experience of the Sixth Battle Squadron in the Grand Fleet.

ORDNANCE.

COMPARISON OF BRITISH AND AMERICAN GUNNERY TRAINING, FIRE CONTROL, CONTROL OF SEARCHLIGHTS, AND CONTROL STATIONS.

Source: Gunnery Officers, Battleship Division Nine.

January 1919.

(11074)

TRAINING.

The system of gunnery carried out on one of the leading ships in gunnery of the Grand Fleet, and in general that of the Fifth Battle Squadron, consists in each turret officer being allowed one day in each week to drill his turret. The day is assigned to him, and he appor-

tions the time and conducts the drills in such manner and for as much time as he sees fit.

Once each week the entire ship goes to action stations (general quarters) and a drill is held using a problem similar to ours. At this drill concentration drill is carried out with consort. Occasionally action stations are held at other times.

It was stated that the desire was to keep the matériel and personnel in condition without the men becoming "fed up," as it was expressed, with action stations. They do not consider it desirable that matériel be used daily for drill.

A gunnery officer of one of the present Fifth Battle Squadron, who is to act as gunnery officer in one of the new ships just coming out, stated that he did not consider it advisable even on a new ship shaking down to increase the number of days per week assigned for drill, but, of course, the time spent on these days would be longer and the drills themselves would naturally be more intensive.

All loading drills are held at the guns. In turrets dummy charges are made up so as to not quite fill the rifling, and consecutive loading is held, each new charge shoving the last charge farther down the bore.

The general practice of the British Navy is to fire one target practice each quarter, and the firings are varied so that they might be considered more in the nature of experimental practices for tests of personnel and matériel under varying conditions. Apparently the same stress is not laid on rapidity or volume of fire. About one target practice in three is held in the open sea, firing at another battleship, under varying conditions of speed and course. This is done by offsetting the director about 4 degrees. This firing is called "throw-off" firing. The target ship observes fall of shot and indicates whether overs, shorts, or straddles.

Weekly exercises under way are held by every unit of the fleet, each ship being assigned a part of one day. The allocation of area is sent out by the commander-in-chief in a weekly schedule. The allocation includes time for getting under way, time for exercises to begin, number of targets required, and time and position of target.

A noteworthy feature is that the exercises are carried out strictly according to schedule, and in the event of weather interfering the exercise does not take place until the unit concerned has another allocation, the remainder of the schedule being carried out as originally issued. Before drawing up schedules each squadron commander indicates to the commander-in-chief what he desires to do during his period. The result of strict adherence to schedule is the accomplishment of a great deal of work in a relatively short time with a minimum of interference with other activities of the ship.

The British do not believe in divided fire. Their organization allows for it, but they do not expect to use it. In case of meeting a

superior force they expect to use collective fire only, shifting the entire battery from one target to another, as the occasion warrants, believing that the increased efficiency of collective fire offsets the disadvantage of leaving certain enemy ships not under fire. On the other hand, however, due probably to the fact that they anticipated having a superior force in most engagements, they have spent considerable time developing concentrated fire.

The gunnery officers are trained in gunnery schools and specialized in their line. It is thought that on an average the British gunnery officer knows more ordnance than is the case with the American gunnery officer, but the battery officers know less than American battery officers. From a gunnery standpoint it is believed the average knowledge of gunnery officers in the United States Navy equals the average knowledge of that of gunnery officers in the British Navy.

FIRE-CONTROL METHODS AND INSTRUMENTS.

Fire-control methods and instruments in the British Navy differ materially from those in the United States Navy. The combination of the Dumaresq and the Dreyer table produces about the same results that the Ford plus the Mark II Board does. However, while the instruments furnished British vessels are the same in principle, the installation, operation, and procedure in no two vessels is the same. Even the instruments themselves, while producing the same results, are not built alike. The graphic flexibly driven attachments to the Ford, which it is understood is now being manufactured for the United States ships, should make the American range and deflection keeping instruments in plot superior to the British.

Spotting practices and training of spotters differ so materially in the two services that no just comparison can be drawn. It is believed, however, that the principles used in plotting and spotting are not such as the United States Navy would care to adopt either in whole or in part. The British, as a result of observation of the performance of spotters of the United States Navy, are considering some modification of their spotting rules.

For transmission dependence is placed on voice tubes and visuals. Telephones are of very poor quality, and but few are supplied.

The British use the "follow-the-pointer" principle in every case where it is possible, not only for gun laying and training, but also whenever there is a break in the transmission system. In the American turret gun-laying system an operator must read the gun range from the range keeper and set it on the range converter. The angle of elevation must then be read from the range converter and set on the Cory transmitter. In the turret the gun layer must read the Cory receiver and then lay his gun to an angle read from the scale,

which is often at some distance from the range receiver. This process requires several operators on each transmission line to read actual figures from one instrument and remember them while transferring them to another instrument. The American system is awkward, slow, inaccurate under favorable conditions, and liable to be fatally so in the stress of battle. The essential feature of the British installation is that nowhere in a transmission system does an operator have to read and remember figures; all he does is to keep one pointer following another. The figures are there to read if occasion demands, but accuracy is attained by the simple process of following one pointer with another, a process which does not involve memory and which lends itself to maximum rapidity.

The British gun-director instruments are all similar to the Vickers instruments used in the American broadside director. The only self-synchronizing transmission apparatus they have is the Evershed, which is not accurate enough for gun laying and training and is never used for these purposes. It is believed that the Ford gun-laying system installed on the *Mississippi*, if expanded to include transferring mechanically the predicted range from the range keeper to the range converter, would embody all the advantages of the British "follow-the-pointer" principle, and would be better than the British system because the Ford is self-synchronizing and the Vickers is not. To realize the full advantage of this system it would be necessary to apply it to turret training as well as gun laying, which could be done by adding to the American target turret system a mechanical method of transferring deflection from the range keeper to the target turret transmitter. A feature essential to the reliability of any such system is that each transmitter and receiver must show actual figures, as is done in the "follow-the-pointer" part of the Ford range converter, and that provision be made to operate each transmitter by hand gear independently of the mechanical "follow-the-pointer" drive. Then if any leg of a circuit breaks down the next transmitter can be operated by hand. For example, the range converter should be so constructed that in case the circuit to the directorscope is shot away the director correction, transmitted by telephone, can be set on the converter by an operator in the plotting room.

The British consider it necessary to have at least one range finder in the top, and the top fully fitted for control of fire in order that there may be no loss in efficiency when low positions are obscured by smoke or the control tower out of commission.

Aside from the spotting rules, which are absolute, there seems to be no standardized procedure for the control of fire. This is left to each ship and the gunnery officer indoctrinated with the general methods to be followed.

SEARCHLIGHTS.

The British are able to control their searchlights both in elevation and train with great accuracy and rapidity, their methods and instruments being superior to the American. Each light is mounted on a sort of turret, in which comfortable and protected stations are provided for the operators; the lights are laid on a target from a control station by means of an apparatus similar to the gun director, using the Evershed system of transmission. Sighting slits are provided at the operator's station in order that the lights may be kept on the target in case the transmission system fails. The mechanical gearing by means of which the lights are elevated and trained is very efficient. It is understood that the entire installation is based on a report of the Grand Fleet searchlight committee, written after the battle of Jutland and based on the operations of the night following that action.

ARRANGEMENT OF CONTROL STATIONS.

In all positions requiring the most experienced men who have most to do with the efficiency of the battery every effort is made to provide for their comfort. This is regarded as of particular importance, especially when it is considered that the personnel will be either operating or standing by their stations for hours at a time. Gun layers, director layers, range-finder operators, lookouts, and control officers are provided with comfortable chairs. This necessitates larger stations than those on board United States ships.

Lookouts are on a lookout bridge which is entirely housed except for openings for each sector. The lookouts are protected from weather, and hence the positions are regarded as decidedly most efficient. The conning and control towers both have wide long slits which can be wholly or partially covered, thereby insuring to the personnel a good view of what is being done outside the ship. The necessity for this arrangement is particularly brought home when attempting to maneuver or fire under any but maximum visibility conditions, and even then periscope vision is often materially interfered with by smoke. The question of the structural strength of this conning tower is one that should be left to the judgment of naval constructors.

With regard to relative gunnery efficiency, it is impossible to give any definite opinion, because target practice results sought are such as to offer no direct comparisons between the two services except on a few points which are briefly as follows:

(*a*) State of training of personnel is equally good in both services.

(*b*) The British patterns are small when firing only one gun in each turret per salvo. It is only recently that they have begun to experiment with salvos fired by all turret guns, and the results of the few salvos so fired indicate that the patterns of their good ships are no better than the patterns of good ships in the United States

Navy. Complete data are not available, but the following figures are submitted as examples of British shooting:

1. The gunnery officer of a ship of the *Barham* class states that his full-gun pattern is from 500 to 600 yards.

2. A published report states that the average full-gun pattern in the Grand Fleet is 475 yards. It is not known what period of time nor what kind of firing is covered by this report.

3. *St. Vincent* on 11 June 1918, fired one 8-gun salvo 20,000 yards range, with a pattern of 500 yards.

4. The results of firing 6 full-gun salvos by ships of the Second Battle Squadron at 20,000 yards range on 28 September 1918, were:

Ship.	Number of guns in salvo.	Pattern.
		Yards.
Erin	8	570
Agincourt	10	325
Do	12	625
Orion	(?)	629
Conqueror	(?)	719
Do	(?)	464

BRITISH DIRECTOR FIRING—INSTRUCTION OF PERSONNEL.

Source: British.

October 1917.

(10908)

At the start of a commission lectures to all the director personnel, the tower crews, the gun layers, and trainers upon dip, tilt, convergence, and the practical side of director firing are essential.

Continuous Laying and Continuous Training.

In the early days of director firing one of the recognized rules was that the layer should so lay the director that he might come "on" about the middle of the roll, and that the trainer should forecast the yaw to bring his vertical wire "on" simultaneously with the layer.

This presents much difficulty. If the roll is of any magnitude at all, the angular velocity at about the middle of it will be so great that the layer is driven to snap-shooting, and there is every chance with anything of a yaw that half the gun layer's opportunities of firing will be lost by the trainer not being "on" at exactly the right moment.

The solution lies in a more or less continuous aim, and this results in a great improvement in the rate of fire.

Continuous Laying.

The director layer endeavors to get "on" toward the top of the roll where the angular velocity is small and where, if he misses the upward roll he has another chance a moment later as the downward roll commences.

A certain amount of hunting the roll will be necessary and should present no difficulty to the gun layers.

Continuous Training.

This is considered essential, and with sufficient practice it can be attained.

As long as training is always in the same direction, whether it be slow or fast, but preferably at a steady speed, the turret director trainer can keep his pointers in line.

But with any ordinary yaw, however, this becomes no longer possible, and reversal of training is bound to occur. The less reversal there is, the easier and less fatiguing it will be for the turret director trainer and the less strain on the training engine.

Much reversing will be saved if the director trainer still to some extent forecasts the yaw.

If there is no backlash and the training valve is responsive, it is possible with plenty of practice for the turret director trainer to keep in line regardless of reversal.

Note.—It should be accepted now as a principle that the layer lays and fires only and that the trainer trains at all times.

Director Crew.

The best instruction for the director crew is to lay on other vessels when at sea. With new men who are learning an experienced officer should be at the trainer's telescope coaching the layer, then at the layer's telescope coaching the trainer.

The layer needs practice in relaying the director not only to take up the effect of a large rate, but also to look out for a change in the ship's period; she often "hangs," particularly after altering course.

When exercising the director crew in this way spotting corrections should be ordered, and range and deflection must be passed from the training station as usual and set on the director. A fairly fast rate is required in order to introduce alterations in the elevation of the director.

The instruction should be largely for improving the time on aim. Constant practice is necessary to enable the director layer to reduce the interval between two salvos of a double—a most important point when concentrating.

This can only be done by experience in firing at the right part of the roll and by judgment as to moving the elevating wheel between the two salvos.

An experienced director layer should always be able to fire within a few seconds of receiving the order; the probable delay will vary with the class of ship. He should be able to fire at least once in every roll.

With power-worked guns it is necessary for the gun layer to keep his elevating wheel still for about 2 seconds before firing, to enable

the gun layer to get his pointers in line. With hand-worked guns this is not necessary, as the gun layers can follow a moving pointer; in fact, when the motion is small the director layer can lay continually throughout the roll.

Director trainers should endeavor to achieve continuous firing, but must remember that if the wheel is reversed just before firing the turret trainers may not be able to follow and a large spread for line will result.

A good director trainer is one who keeps the vertical wire on the target for the maximum time and who also considers the turret trainers.

At hand-worked guns the trainers can better compete with a reversal of training and in ordinary weather absolutely continuous training should be possible.

In harbor the director crew can be exercised—

(i) By laying on a moving vessel.

(ii) By laying on a swinging boom target carried in a steamboat.

(iii) By laying on a swinging or traveling target outside the director tower (armored tower only).

(i) and (ii) Laying on a moving vessel, or on a target carried on a swinging boom in a picket boat, is to a large extent necessarily artificial, because it does not introduce the rolling motion of the ship.

A swinging target in a picket boat teaches the layer to forecast just the small amount necessary to insure that the pointers are still at the moment of firing.

Roll can be produced by running the range up and down and yaw by running the deflection handwheel right and left to whatever extent is required.

The objection to these methods is the wear which will result to the director. It is useful in the elementary stage of learning, but for this reason should not be used permanently.

(iii) A swinging target rigged on the roof of the armored director, or a traveling target on rails, introduces both roll and yaw. It should be used as a time on aim apparatus and has been found to answer well.

Note.—It is recommended that the director crew should do a run from time to time in the turrets in order to keep in sympathy with the work of the gun layer and turret director trainer.

Gun Layers and Turret Director Trainers.

These want constant practice; for the first six months of a commission half an hour daily is not too much, afterwards three times a week.

The director layer during the director crew's exercise both at sea and in harbor presses the trigger at the moment he means to fire. The gun layers and turret director trainers are closed up and follow-

ing the director, and every time the buzzer sounds the distance between their black and red pointers is noted. The trigger should be pressed at intervals corresponding to those which would normally occur between salvos for these exercises. When the turret director trainers are becoming proficient the buzzer must frequently be rung while the pointer is moving, and plenty of stopping and reversing must be introduced.

Of the two the turret director trainer has by far the more difficult work to perform and requires an infinite amount of practice; with this he will improve to a remarkable degree.

A time on aim run, taking percentages of time within 25 feet and 50 feet, is a very good exercise.

Most guns firing at long ranges are brought up for loading. It is, therefore, important to insure that the drill as regards the interceptor is carried out correctly; that is to say, that the gun is not brought to the "ready" immediately the breech is closed, but waits until the gun layer signifies that it is laid to the proper elevation.

This can be exercised with advantage during turret-loading runs by instructing the gun layer to lay in line with the red pointers, say at 15° elevation for each round, and noting the error, if any, when the gun is fired or brought to the "ready." Guns have been fired as they were in process of being relaid after loading, the shots falling halfway.

Records kept at the turret receivers during exercises can be used to construct a very interesting graphical return, showing the fall of shot for each turret individually and, on a general chart, the spread of all the salvos, both for elevation and direction.

When there is a definite target the proficiency of the turret personnel is observed, and a useful check upon the director crew is obtained by the turret officers watching the exercise through the sights and recording the position of the cross wires every time the bell rings. These records, when compared with those taken at the receivers, show the pattern of the director itself.

It must be clearly understood also that to derive the best results gun layers and turret director trainers require practice under far more difficult conditions than obtain when following a moving target with the ship at anchor. This can be achieved in harbor by laying and training the director without reference to an aiming point.

A minor exercise for the gun layer consists of laying his gun a degree or so away from the red pointers, then bringing the black pointers into line again with the red without hesitation and in only one movement.

Note.—It is found at target practice that turret director trainers are assisted if they are given a warning just before firing the first round. The gun-ready lamp would be burning, but the gun might be at the "ready" for some minutes before it is actually fired.

Director Sight Setter.

This duty is a very important one, calling for a quick intelligent man. It will assist the director layer if the director sight setter reports to him all large alterations of range. Practice in changing rapidly to and from the super range strip is necessary, as is also familiarity with the range graduations round about the position of fixed sight. Careful and systematic drill is required, using an ordinary sight-setter's instructional card.

Dipscale and Convergence Setting.

These require considerable practice in the early days of a commission. The instruction should be individual and the purpose of the corrections carefully explained.

Use of Directing Turret.

The elevation and training transmitters in the directing turret can be used to advantage for gun layers' and turret director trainers' exercises in harbor, avoiding the wear which would otherwise come upon the director and upon the training gear by constant use for instructional purposes.

The shooting teacher can be fitted to the directing turret so that the right gun may fire as directing gun and all other turrets follow.

The Turret Trainers.

These have important duties and should always be closed up for drill with the other director ratings.

In director firing the turret trainer is responsible for the safe training of the turret as regards his own or other ships. This is especially important should the training receivers get out of step and is the means of discovering it.

In individual firing with one turret directing, if the target is lost by the trainer the director trainer can put the turret on by his pointer.

Cooperation between these two numbers is, therefore, most necessary, and it is recommended that the valves to center position and to director training position should both be open, so that the turret trainer can take over without delay. Voice-pipe communication between the two positions is essential.

ROYAL NAVAL TORPEDO FACTORY, GREENOCK—BRITISH TORPEDOES.

Source: Reliable; Notes from a Visit of Inspection.

3 December 1918.

(11111)

The Royal Naval Torpedo Factory employs about 3,000 workmen and maintains a very well laid-out range for proving and experimental purposes. The torpedo on which they are concentrating at present

is the 21-inch Mark IV. During the spring of 1918, while working a whole 24 hours a day, they were able to reach a production of 60 torpedoes a week. They are now conducting experiments with a new type of torpedo, the 21-inch Mark V, results of which experiments are said to have been entirely satisfactory.

The description and comments of the various peculiar features of British torpedo practice and design which follow apply only to the latest models of torpedoes.

Exercise Heads.

The exercise heads in general have the same characteristics as those used by the United States Navy; that is, cork buffer inside, oil tracer adjustments, etc. In addition, experiments are being made with the blowing head, which is so arranged that when the torpedo stops the water and oil will be blown out of the head automatically, therefore giving positive buoyancy. It is thought that this is a very desirable feature.

In going to the longer ranges and heavier war heads the torpedoes will all have negative buoyancy for practice running. The heads contain a chamber wherein the depth and roll recorder can be placed, an instrument which is in constant use on the range.

Air Flasks.

The general design of these in the latest British torpedoes is the same as heretofore (that is, both heads screwed in and sweated), but with the one exception, that the water compartment is now made as an integral part of the after end of the flask, as is the practice in the United States Navy, and the water-compartment head is screwed and sweated also.

The water compartment is made of the same strength as an air-flask shell.

The characteristics of the metal in the air flask are about the same as in the United States Navy, and the test corresponds to those in the United States Navy with the exception of the impact test, which the United States has not adopted, but which the British consider of the utmost importance.

The best specimens may pass all of the United States requirements, but if they do not pass the impact test they are at once rejected. Considerable latitude is allowed at times with regard to elongation and ultimate strength, but the elastic limit, reduction, and impact tests are held to very rigidly.

Superheating System.

Admiralty requirements for variable speeds and ranges are apparently very severe. These requirements are that the torpedo shall be capable of being set for 21 knots, 29 knots, 35 knots, and 45 knots. This requires that the reducer have four different settings

and that there be four sets of fuel sprays, four sets of water sprays, and four air restrictions. This is done by means of the cylindrical plug cock containing all of the air, fuel, and water openings, and is a very creditable piece of engineering.

The temperature of the gases in the engine cylinders are estimated to be about 1,100° F. Paraffin oil (kerosene) is used as fuel, which of course has about double the heat units of alcohol used by the United States Navy. The principal points of the British superheating system which are superior to that of the United States are as follows:

(*a*) The use of two fuses of larger size than are now in use.

(*b*) The firing of these fuses mechanically by a very powerful and certain spring and hammer.

(*c*) The time of firing to be adjudged and regulated by the number of initial revolutions made by the engine; that is, the fuses to be fired by the mechanical tripping gear connected to the main engines. It is particularly desirable to keep the engines from racing in the air; also for causing a well-defined delay, so that the fuel may surely arrive in the combustion flask before the fuses are fired, thus insuring a hot shot.

(*d*) The protection of the fuel and water sprays from coming in contact with the hot gases in the combustion flask. In the United States torpedoes the sprays are subject to the hot gases and frequently burn off, causing wreckage of the torpedo.

The Reducing Valve.

Up to within a few months ago a single-stage spring reducer of conventional design was used. The double-spring reducer is now being manufactured. They are oil packed, and it was stated that very little trouble was experienced regarding their operation, but no conclusive data exists as to the loss of air.

In practice the reducing valve seems to hold a very steady pressure. The difference in diameter between a bore and sleeve in British reducing valves is 0.003 inches, and the bushing is made of a special nickel alloy which is exceedingly hard and brittle. The British have found by experience that they must make the bushing of the hardest metal they can find which is noncorrosive. The British are able to run their 21-inch torpedoes at 25 knots speed with a reducing valve only about half the size of that used by the United States, showing that the United States is making a valve entirely too large for the amount of air which it has to handle.

The Main Engine.

This is of the conventional "Brotherhood" type, having four cylinders and capable of nearly 400 shaft horsepower. In order that this engine shall drive the 21 by 23 inch torpedo at 45 knots a separate

oil bottle is carried to inject oil into the main air line and a salt-water pump is attached which injects sea water into the crank case. Torpedoes, as seen at the Royal Naval Torpedo Factory, running in the tank and on the range at a speed of 45 knots had no signs of smoke. Had the present design in use in the United States Navy been performing at this horsepower the wake of the torpedo would have been very conspicuous by a cloud of smoke.

Most of the depth and gyroscope troubles are attributed by the British to engine vibration, which, of course, the United States has not had with the turbine engine.

The Gyroscope.

This is a standard continuous spin design, to which the British are now adding the oblonging feature which causes the torpedo to make a 180° turn of 2,000 yards. This adjustment is not as successful as was expected, as it complicates the distance gear and gyroscope to a considerable extent. Experiments are now being carried on to increase the initial speed of the wheel, which has heretofore been about 1,400 revolutions per minute. It is believed that the United States has nothing to learn from the British with regard to gyroscope control.

Propellers.

The British manufacture their propellers in the same manner and along the same design of blades as the United States. The propellers are apparently given a pitch which will best suit the highest speed; that is, 45 knots. It is believed that this will render them of less efficiency at low speed.

Great trouble is experienced on the range with the permanent list taken by the torpedo on this run, due to the propellers. The propellers are left large and are trimmed on the range to suit the particular torpedo. Careful rolling records are taken of each gun. Thus it is not possible to make standard propellers ready for issue to ships. When a ship damages the tail of the torpedo, the whole torpedo is returned for reranging and adjusting of the propeller diameters.

Depth Mechanism.

Much trouble has been experienced in the past with depth keeping at high speed. It is only since the design of the new type gear mentioned above that consistently successful results have been obtained. The British torpedoes now have considerable negative buoyancy at the start of the run, and seem to be harder and harder to handle as this buoyancy increases. On the new Mark V torpedoes the torpedo starts off at 999 pounds negative buoyancy. It was said that this torpedo had a constant running trim of 3° up by the nose. Conditions of this sort make the pendulum adjustment very difficult. This horizontal trim changes with the speed of the torpedo.

Range Trials.

The firing station is located on shore and is very elaborately equipped with submerged cages and deck tubes, which can be raised or lowered. The firing was done in deep water between narrow shores. Excellent gyro performance was needed in order that the torpedo should not run on the rocks. To this end all of the proving was done with some stock gyros kept for that purpose. This practice was not entirely approved by the British, but the conditions on the range require that no chances of gyro failure be taken. Most runs were 2,000 to 5,000 yards in length. No shots were fired on the proving range of over 7,000 yards.

In firing a long-range torpedo the British either take it out to sea or set it with hard-over-rudder and allow it to circle in the harbor.

Expense and time lost in firing torpedoes at extreme range is a considerable item. When a torpedo is fired by the circle method it only requires a skilled boat's crew of about two or three men. Of course, gyro performance is not obtained.

All British torpedoes are given careful range trials at at least two different speeds. The minimum number of runs is four and frequently this number is doubled. Much running is done in the dark, when searchlights are employed to carry on the work. Floats are placed at each thousand yards.

Though the wake of the torpedo was scarcely visible at times, the method of observation and character of the personnel is such that a torpedo is seldom lost.

The firing pier was most elaborately fitted up with labor-saving devices. This may well be understood, since the number of men was few and the output much in excess of anything which the United States is used to. The total number of men employed was about 30. A commander in the Navy, representing the Admiralty, was the inspector, and had the final word as to whether or not the torpedoes were satisfactory.

Another thing which contributes quite a little to the speed with which the handling and range work can be carried out is a greater strength throughout all the British torpedoes, which will stand more rough handling without damage than the United States torpedoes, but are of course heavier.

The principal aim of the experimental work now being done at the Royal Naval Torpedo Factory is to get normal range. It is the desire to get as long a range as possible.

The best performance so far is 14,500 yards, at 29 knots. This was done with a Mark V torpedo, which is simply a modification of the Mark IV now in use.

The modification consists in making the air flask heavier in going to a working pressure of 3,350 pounds per square inch.

This torpedo carries a 670-pound head and has made 9,000 yards at 35 knots and 14,500 yards at 29 knots. The 45-knot range is expected to be about 6,000 yards.

There is, besides the Mark V torpedo, a Mark VI, 21 by 28 inches, which is in the early stages of experimentation. Very little data can be obtained on this because sufficient progress has not been made. The principal difference, however, is to be the increase in length of the air flask. There is the same talk of increasing the diameter of the torpedo now to 23 inches.

It is believed that the 21-inch torpedo is now getting so long that the British are finding it hard to manage with their present steering devices.

The high grade of workmanship is very noticeable, as well as the careful detailed inspection of parts made throughout the factory. The torpedo is so complicated compared with that of the United States Navy that in order to produce it in any quantity very high-grade inspection work is mandatory. The inspection system as a whole is similar to the one now in use on torpedoes at the Washington Navy Yard, but is, if anything, more systematically and minutely done.

The character gauges, both for shop use and checking, are of a very high standard. Three sets of master-thread gauges were found to interchange perfectly. A great deal of hand labor is done on the torpedo and its parts. Practically no drop forgings are made.

A very profitable day was spent at Portsmouth on the ship which is used as a training school for torpedo and electrical personnel. Much testing of new designs, both on torpedoes and torpedo tubes, is done there. The following points were brought out:

(*a*) The present British standard torpedoes will stand a great many runs without wear or renewal of parts. For this reason very little disassembling is done on shipboard, and the practice of doing so is discouraged.

(*b*) The "oblonging attachment" to the gyro may soon be discarded.

(*c*) The "blowing exercise head" is still somewhat unreliable, but is being perfected rapidly.

(*d*) The new type of "depth gear" is a great success.

(*e*) The superheating system arranged for three or four torpedo speeds is very reliable and gives practically no trouble.

In regard to torpedo tubes the following information was obtained:

(*a*) The new design of Vickers 6-barreled 21-inch bow submarine tube nest is most highly thought of. Each barrel is fired from a high-pressure reservoir of 7.5 cubic feet capacity and safety valve setting of 450 pounds per square inch. *No reducing valve is used,* but the air is allowed to discharge through about 6 feet of 6-inch pipe

to a firing valve having a fixed amount of lift, where it is wire-drawn and discharged into an expansion chamber of about 3.5 cubic feet capacity. From the expansion chamber the air enters the tube direct. The firing-valve seat is 6 inches in diameter and has a lift of about 2.9. The lift when once found by experiment is fixed and the tube pressure varied, if desired, by changing the reservoir pressure. With a tube pressure of 50 pounds per square inch, the torpedo clearing velocity is 40 feet-seconds. This velocity has been found to be sufficient for any normal conditions of submarine torpedo firing.

(*b*) The firing valve is fitted with a device called a "splash reducer." This is a feature of the firing valve which automatically shuts off the air when the pressure in the reservoir drops to a certain point, thereby preventing a lot of the low-pressure impulse air from following the torpedo out of the tube, which would only augment the disturbance or "splash" on the surface of the water and do little or no good as a propelling agent.

The war has brought out the fact that the discharge of a torpedo from a submarine is often clearly indicated by means of this air bubble or "splash" and that the Germans and English have gone to considerable pains to minimize this fault.

(*c*) The broadside submerged-tube question is as yet by no means settled. The "Hood" type of tube for 35-knot firing has not been tested on board ship. A testing tank has recently been built and the "Hood" tube is being tested in it. Reliable broadside submerged firing has not been accomplished as yet for speeds much over 20 knots. Breakage of torpedoes is frequent at the higher speeds and excessive afterbody pressures are necessary. The British torpedoes are much stronger than those of the United States, which accounts in a measure for their being able now and then to get a satisfactory run fired from a ship going 28 knots. A fault which the British are unable to explain develops in their torpedoes when fired at over 20 knots ship speed, in that they take a course abaft the direction in which they were pointed.

The officers in charge of the experiments and design of torpedo tubes are all optimistic about the future of broadside submerged firing in general.

NAVAL RAILWAY GUNS—FIRING WITHOUT OBSERVATION.

Source: Bureau of Ordnance.

January 1919.

The following is a digest of a 23-page manuscript in French relative to firing guns such as those of the naval railway batteries without observation. There is not so much to the theory of firing with

observations, for, as with spotting, it is obvious that one must eventually obtain results. The instruction in almost all schools leads the artillery student to believe that he is always going to be able to use observed fire. Ninty-nine per cent of his instruction is about observed fire. Records show that much more than half of the firing is done without observation. It would, therefore, seem better if the artillery student were given a much larger percentage of his time on the subject which is going to interest him most in practice. Some of the most important firings (those on days for big offensives) can not wait for the weather, and most experienced officers argue strongly that there should be more talk about this kind of firing and less about the ideal firing taught in the schools. This particular note is almost without duplicate in the literature of the subject.

Firing Without Observation.

The fall of the shot fired at a target depends upon the position of the mean point of impact and the position of the particular shot relative to the mean point of impact. There is the ordinary dispersion of the individual shots around the mean point of impact, which component of the whole error we will call the dispersion of the piece, and there is also the error in calculating and placing the mean point of impact. On one firing we may originally place the mean point of impact several hundred yards over; on another firing we may place it considerably short of the target. In the long run there is a certain average degree of accuracy which expresses how good we are as regards putting the center of impact exactly on the target by calculations. In other words, if we examine results we can work out a new kind of probable error. It is possible to consider it almost as our "dispersion in computing ballistic corrections." This is quite a different thing from the dispersion. That is the accuracy of the piece. This is the accuracy with which we make ballistic corrections to fire the piece. It is important to understand clearly how entirely different these two things are. We might have a gun of wonderful accuracy as regards dispersion but have little luck with ballistic corrections, or we might have a gun of enormous dispersion and have good success in bringing the mean point of impact close to the target by calculation.

The Probable Initial Error.

There is a different one for range and for deflection, but they are analogous. Considering the target on the map, we may look at it as though the problem was to place our center of impact near it. Sometimes it will be beyond, sometimes it will be short, and sometimes it will be more or less on the sides. In a large number of firings our placing of the center of impact by calculation will have much the appearance of the grouping of shots around a bull's-eye. In other

words, our probable error in placing the center of impact will, like all other errors, follow the familiar law of probability.

If we find that our average success in placing the center of impact is to get it within 200 meters of the target as regards range and within 50 meters as regards deflection, we can be certain that if we draw a large ellipse of eight times these dimensions each way we will get the center of impact within it. Looking at it differently, we can likewise reason that if we go ahead and make the usual calculations as well as we can that when we have placed our center of impact, if we cover an area around this center of impact equal to the ellipse previously described, that the target will lie somewhere within it. It is a question, then, of covering such an ellipse with fire of a sufficient density that all areas of a size equal to the objectives will get one shot. By doing this we should hit the target. If we cover a bigger area, we unnecessarily sacrifice density of fire. If we cover a smaller ellipse, we risk entirely missing the target.

The method of analysis was to construct such an ellipse and to take a small piece of paper, cut to scale, the size and shape of the target, and turn in the proper direction as regards the line of fire, etc., and to cover this ellipse completely with such a small surface, just as one might pave an area with blocks of a certain size. Then it could be seen where each one of the centers lay relative to the center of impact and a table could be made showing the range and deflection differences between each such center and the center of impact. If the target were very small, there would be a large number of shots which would have to be fired to sweep the vicinity of the target in such a manner as to surely hit the target. If the target were larger, a smaller number of such surfaces would fit into the ellipse of probable initial error, and this would indicate that not so many shots would have to be fired.

In firing all parts of the ellipse would be successively covered because if the fire were interrupted it would be more important to cover first the most probable places. By this form of analysis it is generally agreed that the best results can be gotten out of the expenditure of a certain amount of ammunition in observed fire. Most other methods of accomplishing this are guesswork. Some of the other methods are failures.

The Size of the Ellipse, which Includes All Probable Initial Errors.

There are several methods of getting this. Obtaining it is, after all, the whole trick to the analysis. Three methods are discussed:

(*a*) The direct method of obtaining the probable initial errors from previous firings, examining from the complete records of each firing where the center of impact was initially placed.

(*b*) Indirectly, from an analysis of the errors of the first shots of many firings, by reducing such errors to allow for the fact that the

dispersion of the gun has had an effect in increasing them. In other words, the first shots have averaged farther from the target than the centers of impact on the different blocks, due to the fact that the guns have some dispersion. This is allowed for by taking the probable error of the first shots, squaring it, subtracting the square of the probable error of the gun, and extracting the square root.

(*c*) Estimating the probable initial error by estimating the percentages of error which will appear in the different components of the calculated ballistic correction.

Direct Estimation of Probable Initial Error.

The work is arranged in columns:

Column 1. This column gives the distance of the target on the particular firing for which the data are given.

Column 2 gives the initial error in range. This is determined by comparing the actual range, not with the actual fall of the first shot but with the mean point of impact of the firing as determined by plotting ranges as a function of time and producing the mean curve back to the term of the first round.

Column 3 is the same thing for the deflection.

Columns 4 and 5 are columns 2 and 3 reduced to a common range. Errors are multiplied by the number which would reduce the ranges to a standard range. It is remarked that this is not rigorously correct, but is sufficiently accurate. The systematic errors in columns 4 and 5 are calculated by dividing the algebraic sums by the number of firings.

Columns 6 and 7 are the differences between the systematic errors of columns 4 and 5 and corresponding values in these columns for each firing. The means of columns 6 and 7 multiplied by 0.85 give the probable mean initial error corrected for systematic errors. An ellipse of dimensions four times these values should include everything.

Indirect Valuation of the Probable Initial Error.

The first column in working this out is the range of each firing. Columns 2 and 3 are the errors in range and deflection of the *first shots*. Columns 4 and 5 are obtained as previously. Columns 6 and 7 are the errors in range and deflection of first shots corrected for the systematic errors. The means of columns 6 and 7 are multiplied by 0.85, and the values so obtained are the probable errors of first shots.

Then we go over the individual firings, plot the range as a function of time, and, measuring each shot from the curve, determine the probable dispersions. We square the means of columns 6 and 7, subtract the squares of the probable dispersions, and extract the

square roots. In comparing the methods it may be said that they differ somewhat in principle in that the first one affects in each firing the correction for the dispersion and leaves us with only the probable error of the mean point of impact. The second method averages the errors of first shots, and at a later stage of the calculations works out independently the dispersions. Combining that result later with the errors of first shots, we are able to arrive at probable initial errors in placing mean points of impact.

The Valuation of Probable Mean Initial Error by Estimating Percentage Errors of Various Components of the Ballistic Corrections.

It is believed that the *maximum* errors are as follows:

Initial velocity, 0.8 per cent, or 6.4 meters.
Range tables, 50 meters.
Wind velocity, 30 per cent, or 3 meters.
Wind velocity formulas, 30 per cent.
Air density, 2 per cent.
Ballistic coefficient, 1 per cent.
Map error, 20 meters.
Initial velocity correction formulas, 10 per cent.

All these are worked out, one-fourth of each taken, everything squared, the squares added, and the square roots extracted. As regards deflection, a range table error of 1 mill is admitted. The cross-wind formulas may be said to be 30 per cent in error, the wind may be 30 per cent in error, the ballistic coefficient may be 0.2 of 1 per cent in error, and the map error may be 20 meters.

One criticism is that the density of fire is no thicker in the center of the ellipse, where it is more probable to find the target, than it is on the edges, where it is less probable that it will be found. Doing it ourselves, we might prefer to use formulas which, when the probable initial error has been estimated, would place the shots, spaced according to probability, so that the mean dispersion was four-fifths of the probable distance of the center of impact from the target.

At any rate, from the foregoing it is seen that the French have gone thoroughly into this particular branch of the subject. No similar discussion from other sources is known. No immediate naval application is seen, except that, possibly, in very thick weather a gun might arrange such a pattern from a like analysis. For the use of the naval railway batteries, however, it is believed that this is one of the most important studies which we have so far encountered, as a very large proportion of our work must be without observation, and there should be time to considerably improve results by substituting such methods for inexperienced guesswork.

CALCULATION OF ATMOSPHERIC CORRECTIONS, ETC., FOR NAVAL RAILWAY GUNS.

Source: Notes Prepared by Commander Garret L. Schuyler, U. S. N.

January 1919.

The data for the various elements, temperature of powder, velocity loss due to erosion, change in range due to variations in air temperature, changes in range due to variations in barometric pressure, and changes in range due to wind are all given in the range tables. There are also corrections due to the tilt of the trunnions and the cross wind which affect the laying of the gun in azimuth. These calculations have to be made with certainty and rapidity from time to time as new sondages are received. The work of completing a pit and getting everything ready for firing takes several days, during which time there is ample opportunity to make a number of curves (which, being straight lines, are simple to construct), which will be of material assistance and will standardize the work.

It is possible to construct one very complete set of graphics which can be used for any range. It takes but a few minutes, however, to construct a set of curves for the particular range as described below, and there are certain advantages to this procedure as compared with the more complete and universal graphic. Among these may be mentioned the fact that for each element there is but a single curve to look at and not a complicated network of curves covering the entire sheet in such a way as to invite the possibility of picking out the point of a wrong curve.

In general, the problem is simply to pick out the difference from the range table standard that the barometer, thermometer, etc., is and to perform the appropriate multiplication. This is somewhat complicated by the fact that we receive our values in metric units, whereas the range tables give quantities in foot-seconds, etc. But by considering this in constructing the curves this matter is made easy to look out for. To make a curve we can mark corrections along the "Y" axis and graduate the "X" axis in terms of the particular element with which we are dealing. The correction is thus given its appropriate sign. Only one point need be worked out, for the curve is a straight line, and another point is located on the "X" axis at the point where conditions are normal.

Velocity Loss Curve.

Graduate the "X" axis from 0 to 50 foot-seconds velocity loss, and "Y" axis from 0 up to about plus 1,000 yards. For the particular range, pick out the correction for 100 foot-seconds velocity loss from column 6 of the range tables. Divide by 2 and locate the point for this value above the 50 foot-seconds mark on the "X" axis. We know that zero loss gives zero correction, so that is another point, and we need only correct the two.

In using the curve take the powder temperature of a thermometer in a powder tank; subtract from 90° to see how many degrees cold the powder is. Multiply this by 2, for each degree of powder temperature causes a 2 foot-seconds velocity loss. Add to the velocity loss due to cold powder the velocity loss due to erosion. With this total velocity loss pick off from the curve the appropriate range correction due to the muzzle velocity, being somewhat less than 2,800 foot-seconds. Except in the most extraordinary cases, this correction will always be a positive one; that is, added to the map range.

Curve of Correction for Air Temperature.

Graduate the "X" axis from 5° to 25° C. Above and below 15° C. make a vertical scale for the correction, running up to about plus 600 and down to minus 600—5° C. is 18° colder than normal; 15° C. is 59° F., which is the normal air temperature for which the range tables were made. Since the 5° C. point is 18° F. below normal, multiply column 12 of the range tables for the appropriate range by 1.8. The result is the plus correction for an air temperature of 5° C. Draw a straight line through this point, intersecting the "X" axis at 15° C.

Curve for Correction Due to Barometric Pressure.

Graduate the "X" axis for 730 millimeters to about 780. Above and below the point for 780 mark the vertical scale for the corrections, running from plus 600 to minus 600—780 millimeters times 0.03937 equals 30.709 inches. This is 1.179 inches of barometer above standard. Multiply column 11 of the range tables by this quantity and obtain the positive barometer correction for 780 millimeters. Plot the point and draw a line to intersect the "X" axis at 750 millimeters. Seven hundred and eighty millimeters is 29.53 inches, which is standard.

Curve of Correction for Cross Wind.

Graduate the "X" axis from zero up to 50 foot-seconds, and the "Y" axis up to about 50 minutes, putting the numbers over the 50 on the "X" axis. Half of column 14 of the range tables gives the deflection correction in minutes for 50 foot-seconds cross wind. Plot the point and draw a straight line from it to intersect the "X" axis at zero.

Curve of Correction for Longitudinal Wind.

Graduate the "X" axis from zero to 50 foot-seconds as for the preceding curve. The scale for the correction should run up to about 1,000 yards from over the 50 foot-seconds point. Use half of the range table value given in column 13 for plotting the point for range correction corresponding to 50 foot-seconds of longitudinal wind. Draw a line from this point to intersect the "X" axis at zero.

Curve of Correction for Trunnion Tilt.

Graduate the "X" axis from zero to about 30 minutes' tilt. Graduate the "Y" axis for correction in minutes, running up to about 20. Get the elevation from column 2 of the range tables and reduce to minutes. Multiply this by the tangent of 30 minutes, and the result will be the correction for a trunnion tilt of 30 minutes. Plot the point and draw a line to intersect the "X" axis at zero. If the theodolite is on the right side of the gun, you may write a note on this curve. "If right trunnion is high, subtract from normal aiming angle."

In using the curves for the cross wind and for the longitudinal wind get the values from the wind resolver, and in taking out the correction apply it with the proper sign.

DECOPPERING AND EROSION OF GUNS.

Source: Notes Taken from a Visit to the Experimental Proving Ground at Shoeburyness—Bureau of Ordnance.

(10508) **29 November 1918.**

DECOPPERING.

During this visit a number of gutta-percha impressions were examined, which showed a normal condition of coppering in British naval guns. This coppering is far in excess of any coppering ever seen in United States naval guns, and takes the form of a heavy scale. It forms the worst constriction at about one-third of the distance from the muzzle to the breech. The testimony of a large number of officers showed that they never considered this condition as particularly serious; that it did not ever cause the bursting of a gun; and that its effect on accuracy was so slight as to be inconclusive. It had been found that this copper would accumulate through a large number of rounds and then might be blown out in a small number of rounds. It was the custom to remove this copper by either chemical or electrochemical means when the ship was at a dockyard for overhaul. The subject of decoppering guns was an inactive one until the British recently learned from the French that tin used in a certain proportion would eliminate the copper. This applied particularly to field artillery, in which, due to the large number of rounds fired, coppering often assumed serious proportions. The first experiments carried out by the British were about February, 1918. A tin disk or quoit was placed in the gun between the projectile and powder charge. Extensive experiments showed that decoppering results were very ununiform, and it was believed that this was due to the rather solid formation of the tin, and that it did not volatilize in an equal amount on each shot. In the meantime the French had discovered the same fact, and about May, 1918, tests

were carried out with strips of tin foil 1¼ inches wide and 34 inches long, weighing 51 strips to the pound. The composition used was 40 per cent lead and 60 per cent tin. Subsequent to this test on 22 August 1918 tests were carried out as follows:

A heavily coppered 60-pounder gun was fired 22 rounds. Two rounds were fired without tin, 20 rounds each with five strips of tin (30 drams), and the bore greased. The result was that the gun was entirely decoppered.

On 9 October a 6-inch gun heavily coppered was fired as follows:

Rounds.	Strips.	Remarks.
2	.....	Without grease.
20	6	With grease.

On 19 October the same gun, 20 rounds with grease, each round having nine strips of tin.

As a result of the above two firings in neither case was the gun completely decoppered.

On 19 October a 60-pound gun slightly coppered was given the following test:

Fifty rounds at a rate of four rounds per minute, each round having five strips of tin and the gun greased. As a result the gun was practically free from copper. Further firing with this gun of 100 rounds at a rate of four rounds per minute with four strips of tin for fourth round and the gun greased showed the copper as slightly increased in spots.

On 30 October a 6-inch gun slightly coppered was fired 106 rounds with six strips of tin foil for fourth round. The result was that the coppering was slightly worse.

During all of the tests above mentioned it was particlarly noted that the manner in which the tin foil was inserted and the position in which it was placed relative to the charge was most important. It was found that the best results were obtained when the strips were loosely crumpled and placed between the projectile and the powder charge. The proving ground appreciated the impracticability of attempting to use such methods in service and were expecting to carry out tests in which the tin could be inserted in a practical manner. A series of firings of about 30 rounds with the same gun, with and without tin foil, were carried out in order to determine the effect of the tin foil on accuracy and velocity. The result of these firings was that greater accuracy and greater velocity was obtained with the tin foil. Of course, this condition is not credited to tin foil, but is sufficient to show that the tin foil does not cause any decrease in accuracy. It was further noted that the application of grease on the bore did not affect the operation of the tin foil, but

was entirely to prevent wear, which will be discussed later. It was also noted that the rate of fire made no difference.

As a result of all this firing it is concluded that the tin foil in no way damages the gun, that it certainly decreases the copper, that its rate of decoppering is not always constant, and that it is necessary to so insert it as to have it easily volatilized. It has been recommended that tests be carried out with United States naval guns with tin foil inserted in the charge. The only practical manner that can be thought of is to put this tin either in contact with the powder in very small amounts in each bag or to place a thin sheet in a scrim in the forward end of each powder bag. It is not known whether or not the tin foil will chemically act on the powder and it is not believed that any of the tests quoted above can be considered as more than a guide for American experiments, as it is possible that several different weights of tin may be required in the United States service. All experiments mentioned above were carried out with Army guns. To date no attempt has been made to apply this principle to guns in the British Navy.

EROSION.

The British divided the condition that we know as "erosion" into two conditions, (*a*) *Scoring.* (*b*) *Wear.*

Scoring.

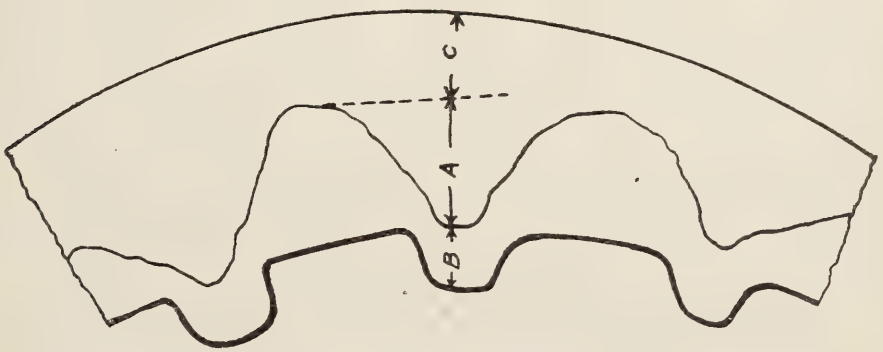
During a visit to the Inspection Department at the experimental proving ground, Shoeburyness, this matter was discussed with the chief gun examiner. Wax impressions were inspected which showed a condition of the bore of the gun that led to the belief that a premature explosion of the projectile loaded with black powder had taken place. However, it appeared that this condition of the gun was only due to scoring, and that even though the grooves were badly scored and the rifling very nearly obliterated the gun was considered entirely serviceable.

An examination of a large number of impressions showed that this scoring usually takes place for a length of about 3 calibers of the bore and that it originates at a position of from 1 to 2 calibers from the origin of the rifle. An inspection of the tables issued by the British Admiralty ordnance department showed that a 15-inch gun was allowed to have scores 1.25 inches deep before it was considered unserviceable. This scoring is directly connected with wear which will be discussed hereafter. Cases were sighted where the scoring had become so deep that it passed entirely through the liner or inner A. 2. The sketch on the next page shows the way scoring is measured and also shows the approximate amount and form of scoring that often occurs.

This condition has never been seen to any extent in United States naval guns and is of an amount to be almost unbelievable to anybody who has not actually seen the condition.

Wear.

The removal of the ribs of the rifling which usually occurs near either the origin or the muzzle is known as wear. It is considered by the authorities at the proving ground that wear has greater effect on the accuracy of the gun than has the scoring. However, it was noted that more guns were condemned for scoring than for wear. Wear is measured at a position 1 inch from the origin of the rifling. It is usually found that the wear is elliptical, the gun getting a greater vertical diameter than a horizontal diameter. A set figure for condemning guns is also given for wear. As an example, in a 15 inch gun (Navy) when the diameter across the lands at 1 inch from the origin of the rifling reaches 0.76 inch greater than the original diameter the gun is withdrawn for relining. A life of



Scoring equals A–B. Wear equals 2. B. Thickness of liner equals A–B–C.

300 rounds is claimed for the 15-inch Navy gun. In the past this claim had appeared rather extraordinary to the gun section of the United States Navy Bureau of Ordance, as it exceeded the life expected from the United States 14-inch 50-caliber gun. However, this extremely great wear and scoring which is permitted before the gun is considered as having reached the limit of its life clears up this misunderstanding and shows that the wear in the United States guns is far less than in the British. No explanation can be be given for this excessive scoring, but it is believed that the chamber design and the gas-checking effect of the rotating band of the projectile must have considerable bearing on this condition. In this respect the United States must be superior to the British.

In an attempt to reduce the wear, experiments have been carried out coating the bore for about 3 or 4 calibers from the origin of the rifling with a thick grease composed of graphite, mineral jelly, and raw linseed oil. It appears from the results obtained with howitzers and field gun that the life has been considerably extended. As

yet no experiments have been carried out with naval guns in this respect, and no practical methods of applying this oil to the bore during rapid fire have been arrived at.

GENERAL NOTES ON PROVING GROUND.

The proving ground is situated at the northern entrance of the Thames River; the line of fire is in a north-northeasterly direction and over sand flats. About three hours of each tide these flats are dry and projectiles may be recovered. It is stated that the sand is sufficiently hard to prevent the penetration of projectiles and that they are usually found lying entirely above surface. By firing from Shoeburyness a range of 20,000 yards can be obtained. Recently firing pits have been installed on Grain Island, which is on the south bank of the Thames. The line of fire from this position passes about a mile to the eastward of the firing point at Shoeburyness and is over the same flats. Firing from that position makes it possible to recover projectiles fired at a range of 35,000 yards. An unlimited range directly into the North Sea can be obtained if necessary. Shore stations, beacons, and lighthouse form triangulation points. A large number of armor-plate butts are installed. It was noted that the armor plate is not placed against heavy wooden braces as is the practice in the United States. The butts are permanent and the plate is placed against heavy steel supports on the sides. It appears a comparatively simple matter to put the plate in position. It is said to cost approximately £25 to install a plate and £25 to remove it. In place of loose sand, all the sand is in bags. This appears to require too much labor, but it was stated that sand in bags stops a projectile more quickly.

NOTES ON FRENCH GUNS.

Source: Reliable—Bureau of Ordnance.

(7737A) **December 1918.**

The French never lined guns or built guns with the intention of relining them until after the beginning of the present war. The problem of repairing worn guns has appeared in connection with the field artillery. It had been the intention of the Franch ordnance department to replace the tubes of worn guns, but this method involved a considerable amount of steel and a large amount of work. The tubes of field guns were of such thinness that it was hardly considered safe to bore out holes in this tube and insert a liner either without shrinkage or to force home with a jack. For a number of years experiments have been made with a method of installing an inner member of a gun by utilizing hydraulic pressure to stretch this inner member or liner in connection with the remainder of the

gun, this system being known as "autofrettage." To date all liners installed in the French guns have been inserted by this method. It is claimed that the method is less expensive than the American method of shrinking and that the strength of the gun is increased 25 per cent. As an example, it was claimed that a tube of from 60 to 70 millimeters in thickness could have 20 to 30 millimeters bored out of it, a liner inserted by autofrettage, and the gun be considerably increased in strength. It was further claimed that this method of liner insertion caused an absolute uniformity of stress between all members of the gun assembly.

In the first experiments a single-piece gun was used and considerable difficulty was encountered with the rather uneven stretching of the metal; in fact, the curves shown were very similar to the curves obtained in the first experiment at the Naval Gun Factory. Later French experiments, using careful adjustment of the location of the packing, resulted in a smooth curve which gave the necessary extension to any part of the gun. It is claimed that it is most important to secure exact pressure to give the exactly correct metal extension for point of the bore of the gun, and of course this extension must bear a close relation to the pressure curve to which this gun is to be subjected.

The steel used is a nickel steel of not over $2\frac{1}{2}$ per cent nickel. The subject of erosion was brought up in connection with this steel and results of experiments were exhibited which proved that the less alloy contained in steel the less the effects of erosion; in fact, these experiments were in close accord with the results set forth in the confidential pamphlet of the Bureau of Ordnance on the life and erosion of guns; experiment with wrought iron had given the best results. However, the French decided that the nickel steel was required in order to give the necessary physical qualities which were required in relining their rather weak guns.

In order to remove a liner, it is necessary to bore it out. At present no relined guns have reached the condition where it has been necessary to remove the liner.

Shoulders are used in a similar manner to our design, and it is not improbable that this method is good practice. The French have not yet had sufficient experience to develop the dangerous results of this possibly faulty design; in fact, with the exception of the novel method of autofrettage it is not considered that the United States has very much to learn from the French in connection with gun relining, and the advantage of quickly removing a liner must always be kept in mind and balanced against any apparently cheaper process of inserting a liner. Furthermore, the French have done practically nothing with naval guns for four years, all their efforts having been concentrated on field artillery and the repair of old and obsolete naval guns which could be used on railway mounts for army purposes.

LONG-RANGE GUN.

The French are proceeding with the manufacture of their 6–10 long-range guns. Their officials admitted that it was of practically no military value, but that it was necessary to meet popular and political demands; in other words, that they had to show that they could do as much as the Germans. Due to the probable short life of this gun it was considered necessary to build a large number of them in order to do any damage.

Before beginning work on the large gun experiments were carried out with a 37-millimeter gun, in every way similar to the proposed long-range gun. It is believed by the French that the results obtained from this small gun have given them all the data that they need for their other ballistics.

Drawings of the gun itself were inspected at the Creusot plant of the Schneider Co. A 35-centimeter 45-caliber navy gun had been fitted with a liner which reduced the gun to 21 centimeters diameter. This liner was installed by "autofrettage." The liner projected well beyond the end of the original 35-centimeter gun and had a total length of 21 meters, making the gun 100 calibers long; the projecting part of the liner was hooped. It is remarkable how closely their method resembles that of the proposed American 9-inch Mark I gun. It was expected that a velocity of 1,450 meters per second would be obtained and that the range would be 100 kilometers; the projectile would weigh about 110 kilos and the powder charge about the same as the projectile. This data of projectile and powder, of course, was subject to variation after proof. The gun rifling is approximately 0.15 inch deep and the grooves are about twice the width of the lands. The rifling is of the form shown in the following sketch:



The driving edge is at right angles.

The projectile was to be double-banded and to have grooves cut on its surface to exactly fit the rifling of the gun. It is feared by the French that a copper rotating band would not have sufficient strength to impart the high rotational velocity to the projectile. The twist is uniform and approximately one turn in 50 calibers.

The life of their gun was discussed, due to the fact that the projectile was to contain rifling grooves. They admitted that the life of the gun would be very short, but that this method was absolutely necessary. The question of the German projectile was then brought up and whether or not the notes on the exterior of this projectile actually match the engraving on the copper rotated band. It was authoritatively stated that this was the case. This information is

undoubtedly accurate, considering the source from which it is obtained. There have been certain rumors in ordnance circles in the United States that the grooves on the projectile were for various other purposes than engaging in the rifling, but the French officers denied this without qualification.

It is not believed that any of these guns will be ready and mounted until the end of the present calendar year; they are to be mounted on railroad carriages.

STEEL.

The quality of steel and forging specifications were discussed. The French are very much against the condition that is known in the United States as "streaks" or "ghost lines." However, they admitted that they had been obliged to take steel of this type from the United States and that no known damage in action had resulted. They claim that their steel did not contain this feature. It was stated that drop tests in a majority of cases resulted in the breaking of the specimen along the streak and that this streak was undoubtedly a dangerous source of weakness, even though there was no lack of continuity of the metal. The condition that is known in the United States as "flake" was not known to either of the officers consulted. Cold straightening was considered detrimental and was seldom allowed. However, no importance was attached to a blue critical point.

BRITISH RANGE FINDERS.

December 1918.

(11066)

With the increase in the effective range of modern torpedoes the function of the torpedo range finder has very considerably increased in importance. Accurate ranges are required to enable torpedo fire to be opened at the earliest possible moment, and they are essential if useful results are to be expected from any system of plotting or inclination measuring.

The range finders fitted or being fitted for torpedo control in the various classes are given below.

Battleships and Battle Cruisers.

HOOD CLASS.

These ships will have three 15-foot Barr & Stroud range finders, arranged as follows:—

One in the after-torpedo control tower in a power-worked revolving armored hood, the arrangement being generally similar to that in gun-control towers. The handwheel controlling the hood-training engine (hydraulic) will be mounted on the fixed structure of the

tower below the hood, the trainer's seat being slung from the latter and revolving with it.

The range finder itself will be capable of independent training relative to the hood to the extent of 5° each way.

One 15-foot range finder in a splinter-proof tower each side of the ship abreast the funnels. These will have an arc of vision of approximately 10°–170° port and starboard, and the mountings will be hand-trained.

All three range finders will be fitted with Barr & Stroud hand-following mechanism for the transmission of the ranges obtained to range receivers in the torpedo-transmitting station, and Evershed bearing indicators will be fitted to the mountings.

Battleships and battle cruisers with 21-inch tubes—*King George V, Tiger,* and later classes are being provided with one 15-foot range finder for torpedo control to replace the 9-foot already fitted in the torpedo-control tower for this purpose. This change involves a complete new hood, racer, and training gear, and considerable modification to the existing mounting. The new training gear will drive the hood direct instead of through the range-finder mounting, as in the 9-foot. The manufacture of this gear has taken a long time, but it is understood to be now nearly complete.

The question of fitting these mountings with hand-following mechanism for the range transmission is under consideration, but it is doubtful if this can be accomplished in the majority of cases owing to the already restricted space in control towers. This gear will be arranged for in the case of *Furious.*

The provision of a specially designed gyro compass receiver, in which a pointer is worked off the training gear showing both compass bearings by the card, and bearings from the fore and aft line, is also under consideration. This is to enable the trainer to train on any given bearing or to keep the range finder steady on any compass bearing whenever the target is temporarily obscured.

The *Orion* class, *Colossus, Lion,* and *Princess Royal,* are being fitted with 15-foot range finders on open mountings.

Renown and *Repulse* are being provided with a 9-foot range finder on each side of the bridge in addition to the one 15-foot in the torpedo-control tower.

Battleships and battle cruisers with 18-inch tubes (except *Dreadnought*), also *Hercules.* All these ships are to have 9-foot range finders on open mountings for use with the torpedo armament. The positions in the various ships differ according to local conditions and requirements.

Light Cruisers.

Raleigh class will have a 15-foot range finder for torpedo control in the combined after position.

Caledon. Ceres, Danae, and repeat *C* and *D* classes—a 9-foot in the after position.

Penelope, Caroline, Cambrian, and *Centaur* classes are to have the 9-foot range finders surrendered from battleships and battle cruisers.

Flotilla Leaders.

The question of fitting leaders and half leaders of torpedo-boat destroyer flotillas with coincidence range finders was raised from sea in February, 1918, the great importance of providing flotillas with ranges of greater accuracy than can be given by hand instruments being pointed out. In order to determine to what extent useful results can be obtained with a 9-foot range finder in these vessels, and also the best position for the mounting, trials were carried out in *Seymour* and *Nimrod.* These trials, which were completed in July, showed that, although in rough weather and when under helm, range finding is very difficult, in calm weather reasonably accurate ranges at over 15,000 yards can be obtained at high speed in spite of considerable vibration. These results were considered to be sufficiently promising to justify the fitting of all flotilla leaders.

Both reports agreed that the after end of the upper bridge is the best position for the mounting, but this question has been complicated by the introduction of the gun director sight, which also requires a position on the bridge in these craft. As it did not appear feasible to accommodate both instruments in this position, it was suggested that the range finder could be mounted aft on the "pom pom" platform, but this idea was strongly opposed on the grounds that it would prove of little value in this position for the following reasons:

(*a*) The difficulty of communication between the range finder and the bridge, particularly with regard to the all-important matter of the object to be ranged on.

(*b*) Its liability to interference by smoke, spray, and exhaust gases from machinery spaces, etc.

(*c*) The comparatively low height of eye and the difficulty of obtaining a sufficiently rigid support.

(*d*) In many cases of day attacks by flotillas, the range finder, if mounted aft, would not bear on the enemy during the "approach," which is the time when accurate ranges are most needed.

The upper bridge of the later leaders is now being "mocked up" with these instruments in place, the range finder occupying the after part and gun director sight the center portion of the bridge. Superimposing the former above the latter and rigging out a small platform on the after end of the bridge appears to provide a workable solution to the difficulty for, anyway, the *V* class and later leaders. In the earlier classes the satisfactory accommodation of both range finder and gun director is still a matter of doubt.

Destroyers.

It has been definitely decided that coincidence range finders can not be fitted in these craft (prior to the *V* class) owing to lack of space on the bridge and to the vibration, which is much greater than in leaders. When ranges can not be obtained from the flotilla or half flotilla leader, destroyers are dependent on hand instruments working on the sextant principle. In the instruments supplied to all these vessels for general purposes, except in the hands of an expert, ranges obtained at over 10,000 yards, at the most, are of little practical value.

TORPEDOES FOR USE FROM SEAPLANES.

1 January 1918.

(10301A, 11066.)

The British 18-inch Mark IX torpedo is an especially light design for use from seaplanes. The total length is 12 feet 10 inches. The

TORPEDO-CARRYING AEROPLANE, SOPWITH (T.)

CARRYING 18-INCH MARK IX. WITH HEAVY HEAD (250 LBS. EXPLOSIVE).



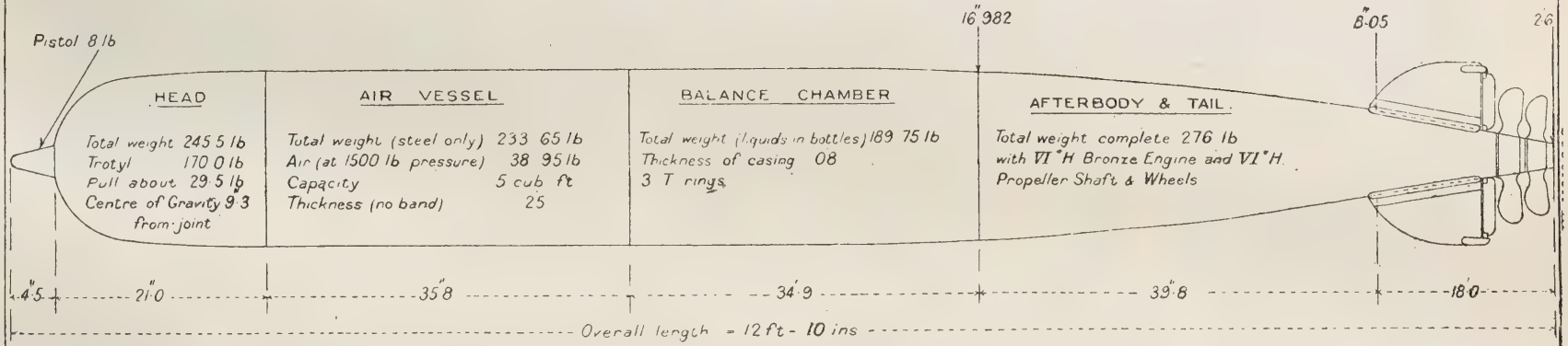
weight of explosive is 170 pounds (amatol); the speed is 29 knots to 2,000 yards; the total weight is 996 pounds.

It might be of interest to compare this torpedo with the German 45-centimeter torpedo (G/125 No. 13555), which was fired from a German seaplane at Ramsgate in April, 1917, dived into the bottom, and was recovered undamaged. It has a range of 2,200 yards at 36 knots and 6,600 yards at 24 knots. The explosive weighs 348 pounds and the weight of torpedo is about 1,681 pounds. It is of the well-known Fiume type, fitted with the Armstrong-Whitehead water heater used by many of the Allies. The pistol is similar to to the normal German type, being fitted with a movable striker, screwed to the rear by a small fan. The object of this is thought to be to provide a safety arrangement in case of a forced landing.

(See frontispiece.)

OUTLINE OF 18IN MARK IX.

(SEAPLANES)



Total weight of Torpedo (as above) - all on - 991 8 lb with no outside fittings
Negative buoyancy (all on) and with water in Engine 20 7 lb.
M C H (empty) about 42.

GERMAN 19.7-INCH TORPEDO.

1 January 1918.

(11066.)

The German 19.7-inch G/7** torpedo (shown in the illustration opposite) had struck a glancing blow under the bottom of a ship which, from the direction of the dents on the head, was proceeding up channel. The depth set was 3 meters (9.8 feet). It ran ashore under the Belle Tort Lighthouse, west of Beach Head, and was found on Christmas Day, 1917, in a position 100 yards from the foot of the cliff. Up this it had to be hoisted. It had run ashore almost at right angles to the line of the shore, and, from the range remaining, 4,400 meters, was probably fired from a position 4 miles to seaward. Its diameter is 19.7 inches.

The maximum range marked on the counter is 12,600 meters (13,800 yards). There are two speed settings, known from other information to be as follows:

High speed, 35 knots to 5,500 meters (6,000 yards).

Long range, 28.5 knots to 10,000 meters (11,000 yards).

The total weight of the head is 530 pounds. The weight of explosive is estimated as 430 to 440 pounds.

The torpedo is fitted for broadside discharge fittings, but these are not in place. Gyro angling gear is fitted in steps of 15° to 90° right and left. Total length is 22 feet 11⅝ inches.

The torpedo is exceedingly complicated and difficult to take apart. The gyroscope is still more complicated and elaborate. The workmanship, however, is superb, and indicates that so far as torpedoes are concerned no expense in labor and material has been spared and no signs of a shortage in the supply of either are apparent.

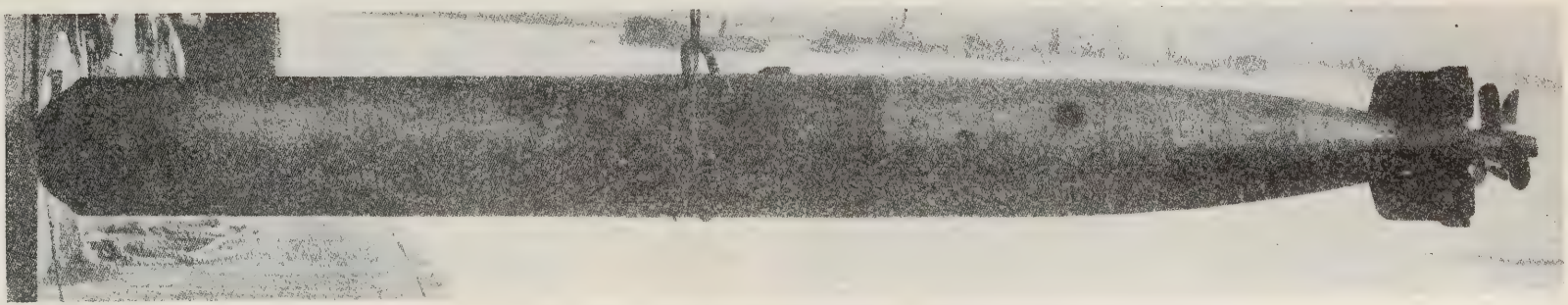
It is almost certain that these torpedoes were taken apart and repaired only by expert labor in shore depots.

An enormous amount of experimental work must have been carried out by Germany to permit of so great a development, the greater part of which must have been carried out during the war. At the beginning of the war the weapon just coming into general use appears to have been a torpedo identical with this one, except for the heater and gyroscope and for an increase of about 1 foot in the length of the air vessel. This torpedo had a range and speed of 5,000 meters at 27 knots. The range of the 19.7-inch torpedo has therefore been doubled and the speed at the same time increased by 1½ knots. This represents an enormous increase in power.

The fact remains that for some reason or other the track left by German torpedoes is more visible than that left by the British. This is the only superiority which the British have, but it is a point of the very greatest importance.

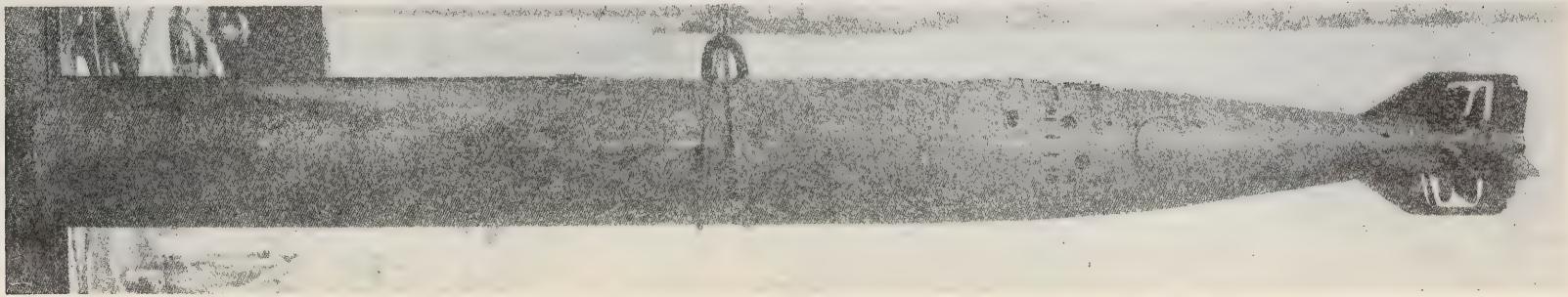
GERMAN 19·7-INCH TORPEDO.

(Recovered Floating.)



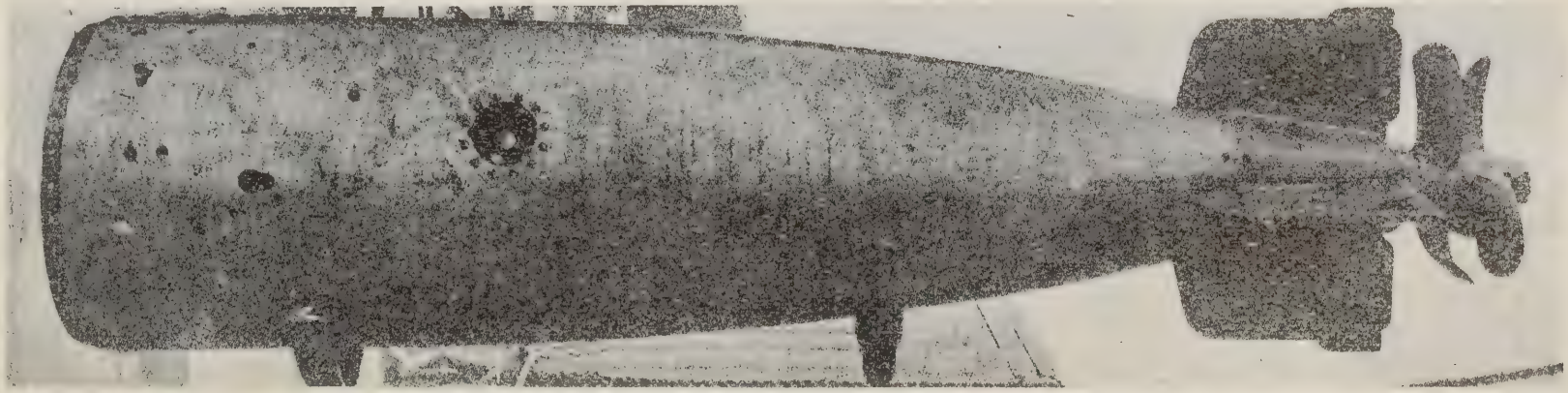
GERMAN 17·7-INCH TORPEDO.

(Fired by Aeroplane.)



TAILS OF GERMAN 19·7-INCH TORPEDOES.

SQUARE TAIL. PROBABLY S/M TYPE.



Igniter Pocket.

FISH TAIL. PROBABLY SUBMERGED-TUBE TYPE.

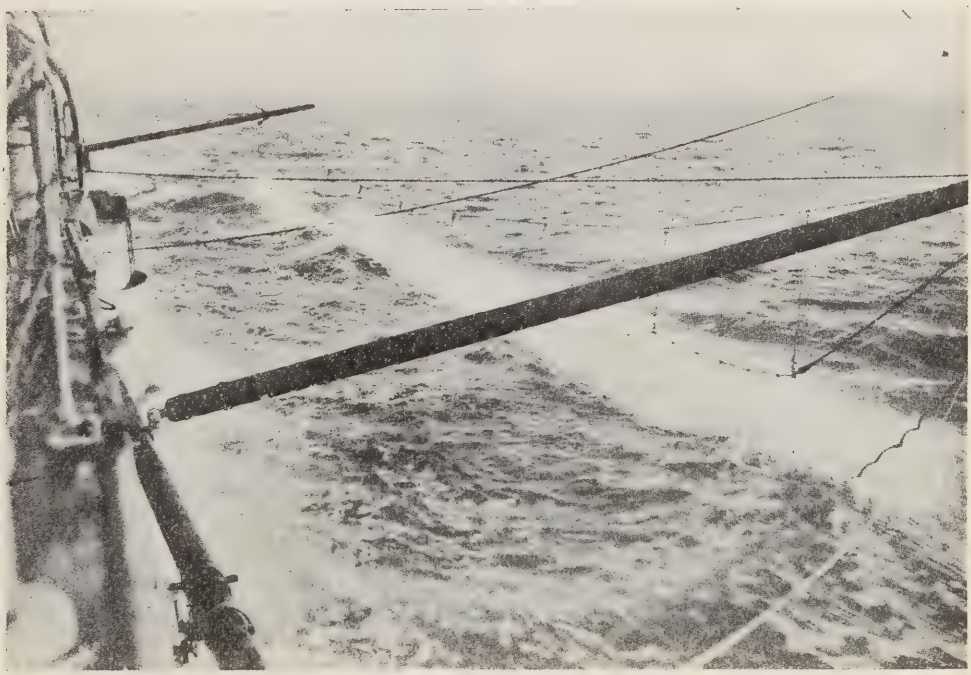


"ACTÆON" HIGH-SPEED NET.

SPEED OF "DIAMOND," 19 KNOTS.

VIEW FROM AFT.

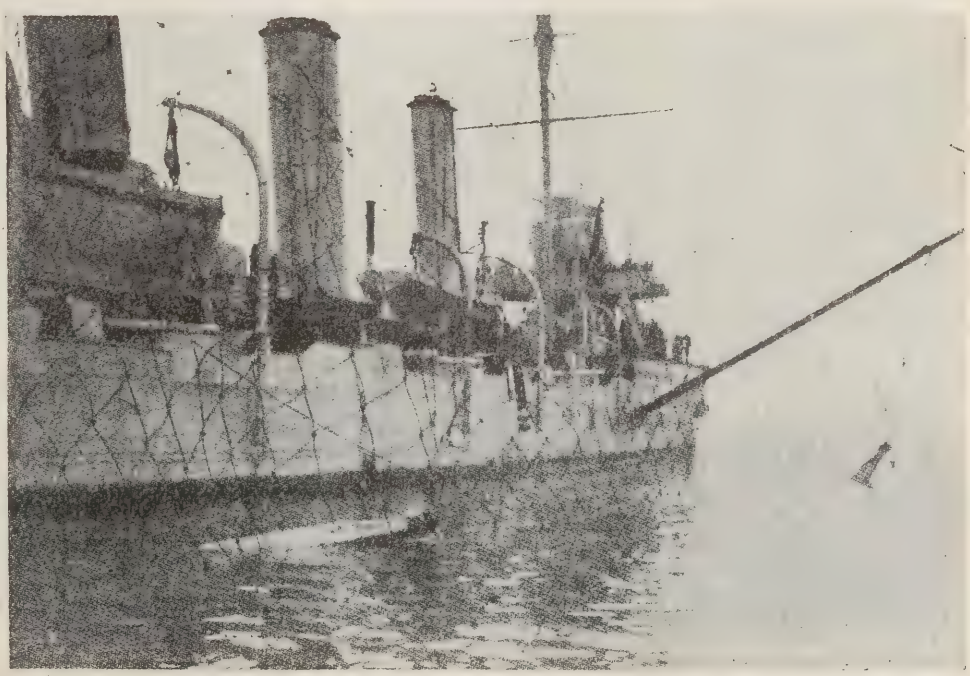
FIG. 1.



TWO HEATER TORPEDOES, FIRED FROM T.B. 19, WHICH STRUCK NET AT 70° FROM RIGHT AHEAD.

SPEED OF "DIAMOND," $8\frac{1}{2}$ KNOTS.

FIG. 2.



"ACTÆON" HIGH-SPEED NET.

TORPEDO CAUGHT AT 17 KNOTS.

FIG. 3.



TORPEDO CAUGHT AT 19 KNOTS.

FIG. 4.



THE ACTAEON HIGH-SPEED NET.

(11066.)

The object of this net is not to stop torpedoes, but to deflect them downward so as to pass under a ship or, preferably, to catch them by the propellers. In order to effect this it is necessary for the ship so protected to be steaming at least 8 knots; the net has been towed successfully up to a speed of 19 knots.

The fore foot of the net is held out by an otter; a 3-foot kite is secured by a 6-foot span to the lower side of the otter to keep it vertical and the fore foot down. Similar kites are attached to the center and after end of the net, and the foot rope is weighted at intervals.

A large number of trials have been carried out with 18-inch torpedoes fired from various angles. As a rule the torpedo is caught by the propellers and is towed along by the net. In some cases the propellers are not caught, but the pull of the net deflects the torpedo downward. In such cases the torpedo may bump under the bottom of the ship, but the pistol is not likely to receive a direct impact.

The difficulties entailed in carrying such nets are obvious; it is unlikely that they will stand rough weather; they take a knot or two off the speed of the ship; if they carry away they will foul the propeller, and considerable labor is required to put them in or out. Nevertheless the scheme should prove of very great value, at any rate until means have been found to defeat it.

MINES LAID BY *WOLF*.

Source: British.

30 November 1918.

(9496–Z.)

Charts have now been received from German Admiralty showing positions of mines laid by *Wolf*, with the exception of the field off Aden, which was laid by *Turretella* with mines transferred from *Wolf*.

Generally speaking the information agrees closely with that deduced and inferred from information obtained from various sources during the course of the war.

Two fields have not yet been located. The existence of one off Anamba Islands, China Sea, was known, but extensive searches had failed to locate it, as the position in which it is stated to be lies farther into the China Sea than it was thought *Wolf* could possibly have reached. The other, off Wedge Bank, south of Cape Comorin, India, was not suspected.

All mines were laid very deep, a fortunate fact. It was, however, no doubt intentional on the part of the enemy in order that large vessels should be caught and the positions of the various fields not indicated by small local vessels, such as dhows and junks, striking mines.

Localities of mine fields, number of mines in each, and date laid are as follows:

Locality.	Number of mines.	Date laid.	Accounted for.
Dassen Island (near Cape Town)	25	Jan. 16,1917	15
Cape Agulhas	29	Jan. 18,1917	7.
Colombo	30	Feb. 15,1917	29
Wedge Bank, Cape Comorin	19	Feb. 16,1917	.....
Bombay	110	Feb. 19,1917	68
Bass Straits	30	(?)	15
Cooks Strait	35	June 27,1917	14
Three Kings Islands	25	July 25,1917	17
Anamba Islands	110	Sept. 4,1917	[1] 4
Aden	[2] 25	(?)	21
Total	438	.....	190

[1] Drifting. [2] Estimated.

TORPEDO DEEP RUNNING AND RELEASING GEAR.

(11066.)

The torpedo deep running and releasing gear is designed to make the torpedo run four times its set depth, and to release after having run a distance which can be adjusted on an auxiliary range wheel. For example, if the torpedo is set to 15 feet and the deep gear locked it will run at 60 feet until release of gear, when it will come up to 15 feet, taking about 500 yards to rise this distance. The speed of the torpedo is not affected by the depth.

By this method the tactical utility of the torpedo is greatly increased, as it may thus be run with impunity under friendly ships while still rising to its correct depth before reaching the enemy.

AUSTRIAN BATTLESHIP *RADETZKY*.

Source: Reliable.

14 January 1919.

(11069.)

In accordance with the terms of the armistice with Austria-Hungary, the Austrian battleship *Radetzky* was taken over by the United States Navy at Spalato on 13 December 1918.

The battleship *Radetzky* was laid down in December, 1907, and completed in 1911. She is one of a class of three battleships to which class she gives her name. This class is of a pre-dreadnaught type but is, after the *Viribus-Unitis* class, the most powerful group of ships of the former Austrian Navy. Her armament consists of a main battery of four 12-inch 45-caliber guns and eight 9.4-inch 45-caliber guns mounted in turrets. She has a secondary battery of twenty 3.9-inch 50-caliber guns and other smaller guns. She was built at Stabilimento-Tecnico, Trieste.

She is designed for a speed of 20 knots.

CONSTRUCTION AND REPAIR.

NOTES ON THE SURRENDERED GERMAN SHIPS.

Source: Hector C. Bywater, in the "Naval and Military Record."

18 December 1918.

Officers who have visited the *Bayern* and ships of the *Kaiser* and *König* classes do not conceal their admiration for the defensive qualities of these vessels. Evidently the designers intended them to stand an enormous amount of punishment without being disabled, and if the hearts of the German crew had been as stout as their ships they might have done wonders. In the *Kaiser* class the principle of subdivision has been carried to extraordinary lengths, and movement below deck is rendered difficult by the multiplicity of bulkheads. The boilers are isolated in small groups, and each set of propelling machinery is cut off from the next by very thick bulkheads. Three or four direct hits by the heaviest projectiles would be needed to bring one of these ships to a standstill. The disadvantage of all this elaborate protection is that it greatly restricts the living spaces, and in view of the swollen complements borne on every German ship, life on board must have been somewhat trying.

Much of the same conditions prevail in the battle cruisers. In armor and subdivision the *Seydlitz* is understood to mark a distinct improvement over the *Moltke* and *Von der Tann*, and a careful inspection explains why she survived the terrific hammering inflicted on her at Jutland. In the official German account of that action, it may be remembered, the *Lützow* is stated to have remained battleworthy after receiving 16 square hits from shells of 12 to 15 inch caliber and did not founder until she had been torpedoed. There is no doubt whatever that the later German capital ships are second to none in the important element of protection. To attain the highest possible degree of immunity from gun and underwater attack the designers did not hesitate to sacrifice hitting power and habitability, and it would not be surprising to learn that the extreme discomfort of life on board had something to do with the collapse of the German seamen's morale. An officer of the *Seydlitz* is said to have volunteered the information that his vessel was hit repeatedly by H. M. S. *Lion* and her consorts in the Dogger Bank fight, and would undoubtedly have been knocked out but for the fact that the British ships were firing high-explosive shell, which failed to get through her thick armor.

There does not appear to be anything particularly noteworthy about the battleships of the *König* class, which are only slightly larger editions of the *Kaiser* type, and have all their big guns on the center line. Some of these vessels have a very thick foremast and are all fitted with masthead control stations. The *Bayern*, however, represents a much stronger type. Her eight 15-inch guns are placed

well amidships, leaving the bow and stern unburdened with great weights and presumably making her a very steady ship. The upper works have quite a British look, accentuated by the tripod foremast and the big fire-control station on it. The forward conning tower is a very large double-storied structure and is said to be faced with 16-inch armor. The 15-inch guns are 45 calibers long and have an extreme elevation of 30°. According to statements by her crew, this ship has never been in action, though it was generally understood that she had been present at Jutland. Unofficial estimates place her full-load displacement as high as 31,000 tons. It is well known that the Germans for many years have been systematically understating the weight of their ships for fairly obvious reasons. So far very little information has come to hand with regard to the surrendered battle cruisers, but from the photographs that have been received they appear to be sisters. The freeboard is lower than that of any other ship of this type, but if invisibility was aimed at, the effect is quite destroyed by the lofty upper works, which make the vessel very conspicuous. There are rumors that the *Mackensen* mounts eight 15-inch guns, but as every German ship built in the last 10 years was popularly credited with about twice her actual gun power, this story should be accepted with reserve.

The light cruisers are trim vessels of 5,500 tons or thereabouts, armed with five 5.9 inch quick-firing and several smaller pieces, including anti-aircraft guns. Two of the 5.9's are placed abreast on the forecastle and two on the poop, the fifth being on a raised center-line platform abaft the third funnel. The broadside fire is therefore from three and the axial fire from two guns. This is an improvement on the pre-war armament of twelve 4.1 inch, but is still inferior to British light cruiser armament. The original speed of these new German light craft is not known, but at present it is not over 18 knots, the machinery having visibly suffered from the lack of lubricants and the use of some inferior substitute. The general condition of all the vessels, from the *Bayern* down to the smallest destroyer, is not such as to convey a flattering opinion of German naval discipline. Tarnished paint is not in itself an indication of inefficiency, but only one conclusion is to be drawn from the dirt and disorder which prevail on board these former German fighting ships, and the contrast is the more striking to anyone who knew how spick-and-span these ships or their predecessors were wont to be in the piping times of peace. "A floating pigsty" was the terse description given of the *Friederich der Grosse* by a British officer who surveyed her. It is only fair to add that there were several exceptions among the surrendered fleet, including one light cruiser, which was spotlessly clean from stem to stern, and it was, perhaps, not quite a coincidence that this was the only ship in which the men punctiliously saluted their officers.

COMPARISON OF BRITISH AND AMERICAN NAVIGATION EQUIPMENT.

Source: Navigation Officers, Battleship Division Nine. **January, 1919.**

(11074)

Navigation Department.

Bridges.—In position and for comfort the British bridges are far superior to the American, being as a general rule about 15 to 20 feet higher and much more thoroughly protected from the wind and weather. Bridges are built right around the foremast and are generally on three levels, lower being for signal work, middle for messengers, ship's routine, etc., and the upper for the officer conning the ship and for the chief signal rating on watch.

All steering gear, engine-room telegraphs, revolution telegraphs, etc., are in the conning tower, from which position the ship is always steered. Most of the voice tubes also go to the conning tower, although some go direct to the bridge, and the officer conning has direct voice-tube communication with the conning tower and steersman. None of the outer bridges are fitted with steering positions.

The usual splinter mat protection is provided to exposed positions where possible.

During battle it is the usual practice for the captain and navigator to remain on the upper bridge, the navigator conning and plotting the ship, with a junior officer in the conning tower keeping station and running the ship routine. On squadron flagships the navigator never takes the deck, an officer being detailed specially for that purpose while the ship is at action stations.

Conning tower—The ship control in the conning tower is very similar to that in use in the United States Navy, as is also the general arrangement of gear. The conning towers themselves are raised higher and the slits are much bigger, affording a very much better outlook. Some of the conning towers have practically one continuous slit all the way around.

Navigational Instruments, Books, etc.

The navigational instruments are almost identical in the two services, as are also their sailing directions. Their notices to mariners come out in two forms—one a general notice to mariners issued to the naval and merchant marine and the other a fleet notice to mariners and sent only to military ships. The fleet notice to mariners contains only information which is not to be known outside the naval service, and in order to keep the charts and publications up to date it is necessary to consult both the fleet and general notices.

The charts are issued in portfolios very much the same as the American, but are all backed with a very thin cheesecloth, which helps to keep them flat and in good condition. The engraving and

printing on the British charts is not nearly as good as on the American. The system for correcting the charts is the same.

Whenever a new chart is issued to supersede one already on board the Admiralty require a certificate signed by the commanding officer that the superseded copy of the chart has been destroyed.

Gyro compasses are installed in all ships above the light cruisers. These compasses are checked with the magnetic, however, the same as in the United States service.

NOTES FROM BATTLESHIP DIVISION NINE.

INFORMATION BASED ON EXPERIENCE WITH GRAND FLEET

Source: Rear Admiral Rodman, U. S. N.

20 January 1919.

(9862C.)

Kite Balloons.

One of the very important possibilities in the development of fire control is the use of kite balloons. This may be in combination with smoke screens. Balloons have already proven extremely valuable in battleships for fire control (spotting), sighting torpedoes, and for distant observation. There are mechanical difficulties to overcome; for instance, they are very liable to be struck by lightning or be carried away by winds beyond 75 miles an hour. Also, there are mechanical difficulties in landing the observer on deck in heavy weather. One of the principal objections to them lies in the fact that the enemy can sight them from a great distance. This can be overcome to some extent by heaving them down close to deck, weather permitting.

High-Speed Mine Boats to be Carried by Battleships.

The use of a small mine-carrying high-speed motor boat has been suggested in the navy of a foreign power. It was intended that this boat be dropped from a battleship in time of action and lay, if possible, two connected mines in the path of the enemy. It is not believed that such a plan would ever be advisable. Mines or depth charges on board a battleship are out of place. They would add to the danger of loss without adding any practicable strategic advantage. It is considered a serious mistake to attempt to make any one type of vessel fulfill the mission of all other types.

Gas Warfare.

It is believed that a certain percentage of all shells on board ship should contain gas, particularly for use in beginning an engagement.

With regard to defense against gas clouds, it seems possible that in the future aircraft may threaten the head of a column by dropping containers filled with gas. Resulting measures might have to be taken to clear compartments of gas. As the gas casualties occur in such a very short time, these measures, if used at all, would have to be quick acting. It would seem that a system of compressed air would be the most logical. Due to the possible developments of gas warfare, this problem of clearing compartments or of sealing a ship in a gas cloud will be most important.

Placing of Armor on Capital Ships.

A late practice in the British service for installing armor consists in the arrangement of a network of small tubes, which form a cushion against which armor rests. It is claimed that by this method the shock is so absorbed that it will not be required to carry armor as heavy as previously used.

Communications.

Of all the problems raised by this war there are none more important than those of communication and recognition. Communication today is the hardest problem we have in the Navy. Among the developments of immediate importance is that of the radio telephone. Theoretically this instrument is ideal; in practice it has not proven successful, due to mechanical difficulties, the outside radio interferences, and local noises. It is exceedingly important that we should develop immediately the radio telephone to as near perfection as possible.

Recognition of enemy craft is another vital problem. In the battle of Jutland it was found impossible in many instances to recognize friends from foe.

In time of war it is very advisable to paint the silhouettes and salient characteristics of all enemy types of vessels in the vicinity of each gun.

In making recognition signals the ordinary method was by flashlight, both day and night. During action recognition signals among friendly ships were generally made by each type hoisting a shape either of solid form or, for example, a triangular piece of canvas. In addition to these, all types of vessels during an engagement should fly a colored flag which could be recognized.

Paravanes.

Regarding the use of paravanes on destroyers it is believed that under some circumstances they would be very useful though they would undoubtedly cut down the speed.

For battleships a detraction of speed of about one-half knot results. It takes about three minutes to ship a paravane and eight minutes for unshipping. The draft of paravane runs at about 35 feet from a battleship and about 20 feet from a destroyer.

Antitorpedo Construction.

A late practice in the British service is to install what are called "blisters" to the hull of a ship. These take off about 0.4 of a knot of speed in battleships that make over 20 knots. It is believed that the British are making more cellular compartments in the underwater body than previously used.

The danger of capital ships from torpedoes in the North Sea was considerable. Every type, however, has to take chances. Under all conditions when battleships went to sea every precaution was taken to avoid danger from both mines and submarines. All channels leading from the harbor into the open sea were swept and patrolled. All battleships at all times were accompanied by screens of destroyers.

Intelligence Bulletins.

During war and during peace it is an excellent plan to disseminate to the service confidential information of value. It would be a very good idea for officers to write articles for this bulletin, providing they could be short and to the point.

COMPARISON OF PROVISIONING AND SUPPLY SYSTEMS OF UNITED STATES AND BRITISH NAVIES.

Source: Committee of Officers, Battleship Division Nine.

January 1919.

(11074)

In the British service the requisitions are made out for supplies, stating when the supplies will be required. Thereafter the furnishing of the supplies is handled by the naval store officer, who keeps himself informed of the movements of the ship and her activities, to the end that supplies are furnished to the ship at the time when they are necessary. It is unnecessary with this system for the ship to limit her activities to meet the requirements of the supply system, the naval store officer being furnished with the means of transporting and delivering the supplies to the ships.

In other words, the British supply system exists to supply the fleet. For the proper operation of the British system it is necessary to keep the naval store officer informed of the location of the fleet and all prospective movements.

In the United States service it has been the practice to transport a large percentage of supplies by ship's boats and to handle them with ship's personnel. Congestion of the supply system frequently makes it necessary to send ship's boats and working parties at inconvenient times, and the movements of ships have been frequently hampered from this cause. Also numerous small trips for small deliveries are called for, this being sometimes due to the desire or necessity for clearing a congestion at the supply depot.

NOTES ON BRITISH AND UNITED STATES NAVAL PERSONNEL.

Source: Committee of Executive Officers, Battleship Division Nine.

January 1919.

(11074)

In general, it would seem that the United States ships have carried during this war more men, type for type, than the British ships. This seems to be due to two things: First, the United States naval policy is to conduct more activities aboard ship by man power than the British do in their ships; the second consideration is that a large number of the enlisted personnel of the United States Navy are not men but unseasoned boys, and consequently it takes more of them to do manual work than would be the case with fully developed men. Furthermore, the United States Navy attempts and actually accomplishes very much more repair work and upkeep work on board ship than any of the British ships attempt.

The general impression, after investigation, is that the British, at least theoretically, lay more emphasis upon the fighting qualities of their ships, while the United States lays an added stress upon the daily life of the ship.

Fundamentally, in so far as organization for battle is concerned, the British and American standards are much the same, and the organizations are not dissimilar. Both services attempt to accomplish the same purpose, and the fundamental principles striven for by the British are the same in general as those for which the United States strives, except that there is a slight difference in the method of approaching them, due to differences of personnel equipment and the building up of the system.

But for other activities which concern the business of the ship for other than battle conditions—that is, for her daily work—the organization in the two services is quite different. In the American service the division officers are usually responsible for the personnel in their divisions and the activities of the personnel, including their instruction, drill, and cleaning of the ship. The division officer is also responsible for the upkeep of all the material in his division and the equipment which is assigned to him for use in action and his daily work. This is not true in the British service, where these activities are divided under department heads who are specialists in the particular activity concerned.

GERMAN NAVAL COMMENT.

STATEMENT OF GERMAN WARRANT OFFICERS REGARDING THE SPIRIT OF THE GERMAN NAVY.

Source: Berliner Tageblatt.

13 December 1918.

(10894)

[Although this article is two months old, it is considered that its historic significance may make it of enough interest for publication.]

As the German people have now more than ever the right to know the naked truth in regard to conditions in the Navy, a third voice may be heard on this most important question. The opinion expressed is not the view of some single individual, but it represents the *unanimous conviction of the 4,000 warrant officers of the German Navy*, of men who have all served from 15 to 25 years, and who, by reason of their experience, may well claim to be able to pass a just and objective judgment.

Nobody can dispute that at the beginning of the nineties of the last century the spirit and sentiment in the German Navy was a most excellent one. The connecting links between officers and men were, in the true sense of the word, the warrant officers. There was between officers, warrant officers, petty officers, and men that true spirit of comradeship which found its most beautiful expression in the unconditional confidence in the naval officer and his leadership. Soon after the beginning of the reign of Emperor William II, a new spirit began to make itself felt in the navy caused by "Imperial graciousness" (*Kaiserliche Huld*) and favoritism. The consequence was that the naval officer was inclined to eliminate everything which might injure him in influence and prestige. Acting on the principle "we are not tolerating any gods besides us," they allowed the middle position of warrant officer to disappear altogether by pushing it down to the level of the enlisted men. Thus the very important connecting link between them and the crew was lost. In connection therewith the influence of the petty officers also sank; they could now no longer see in the promotion to warrant officer the aim of their careers, and as soon as they had procured their "Certificate for employment in the civil service" they left the naval service in masses. The regular naval officer also succeeded in creating a chasm between himself and the so-called specialist officers (naval engineers, paymasters, ordnance officers, torpedo officers).

At the outbreak of the war matters stood like this: The regular naval officers formed an exclusive corps by themselves, hermetically closed to all outsiders. No connecting threads were spun between them and the thousands of men, who were considered inferiors.

Working exclusively for the interests of their class, the naval officers had no eye or ear for the cares and sorrows of the men aside from the fact that these young gentlemen, in consequence of their one-sided caste education, lacked the least comprehension of these questions. Such a conduct on the part of the naval officers was naturally bound to lead to complete estrangement, and the confidence of the men in their officers, so absolutely necessary in time of war, was lost. With such a spirit in the corps of naval officers, it can be easily understood that qualities were developed in a great majority of them which were openly in public characterized as haughtiness, pride, world estrangement, disrespect to the men, and false treatment of the same. If the naval officer would not have become so completely estranged from his men, he would certainly have noticed in the last two years of the war what an awful amount of resentment, hatred, and bitterness had accumulated in the men through the facts given above. But, nevertheless, all those who have witnessed the events in Kiel must concede the fact that even in the twelfth hour a good deal could have been saved if negotiations between man and man had been carried on. But the naval officer was deaf and blind even on that occasion. For the most part through the fault of the naval officers a mutiny broke out of the sailors and firemen, which in a few hours brought about the general revolution. Thus here also the more than pan-Germanistic spirit of the corps of naval officers was responsible for the uprising in an overwhelming degree—Tirpitz in the great things, the individual naval officer in the small things.

CAPT. VON MÜLLER ON "PERSIUS AS AN EXPERT."

Source: Deutsche Tageszeitung.

28 November 1918.

(10893.)

[*Note.*—Capt. von Müller, who commanded the *Emden* on her famous cruise in 1914, is here replying to the article by Capt. Persius, a translation of which was given in Semi-Monthly Compilation, O. N. I., Series LXV, 1 January 1919 pages 65–69, on the "Weakness of the German Navy."]

In the Berliner Tageblatt of 18 November, an article by Capt. Persius (retired) was published, in which he speaks of the fight between the *Emden*, which I commanded, and the *Sydney*. The erroneous statement made by Capt. Persius concerning the age of the two ships, and indignation at other matter contained in his article, as also in the article in the evening paper of 23 November, lead me to ask you to publish the following open letter:

When Capt. Persius, in his article of 18 November, asserts that, "owing to the faulty constructional methods of Herr v. Tirpitz, German material was inferior to that of the British," he entirely

misrepresents the facts. First of all, I wish to point out that the German administration of the navy was very much more restricted as to its expenditures than was the English, and, therefore, was obliged to proceed with caution, but every act was so thoroughly weighed and considered that in no other navy with like means at its disposal has so much been accomplished as in the German.

To speak frankly, Capt. Persius makes himself ridiculous when he reproaches Grand Admiral v. Tirpitz for allowing the English to set the pace in increase of tonnage, which is synonymous with increase of expenses.

The plans for the building of new warships under Admiral v. Tirpitz in the Imperial Navy Department have always been made the subject of extraordinarily thorough study, which differs from the method followed in other navies. At meetings he listened to everyone, even the youngest officer, and was always willing to give heed to any logical suggestions. It is commonly acknowledged that in the choice of his expert advisers, Privy Councillors Burkner and Veit, he was most fortunate.

As is well known, each warship has to be adapted to a great number of requirements, to the variety of which is due the differences existing between the warships of individual navies. And so it is that until the most recent times the question as to whether a few heavy guns are preferable to a number of guns of somewhat smaller caliber is differently answered in each navy.

The assertion made by Capt. Persius that Grand Admiral v. Tirpitz had shown no initiative in the procuring of greater speed and larger caliber guns is entirely false. For example, on the dreadnaughts in the German Navy the 15-centimeter gun was used from the very first, while in the English Navy the use of the 10.2-centimeter gun was adhered to for a long time; and, further, it was Grand Admiral v. Tirpitz who decided on the employment of 38-centimeter guns on ships of the line before anything was known by other navies concerning the installation of guns of such large caliber.

Finally, how a ship stands the test of war is the decisive proof of its fitness, and this proof was given by the performance of our ships in the Skagerrak fight, and in the telegram from Admiral Scheer, in which he gave spontaneous expression to his recognition of the splendid material placed at his disposal.

In speaking of the battle between the *Emden* and the *Sydney*, Capt. Persius gives it to be understood that the ships were of equal age. In point of fact, the *Sydney* was built four years after the *Emden* was launched, and, moreover, her tonnage exceeded that of the *Emden* by 2,000 tons. The small English cruisers of the same age as the *Emden* carried only 10-centimeter guns. The small cruiser type in the German Navy has been long considered, even by

the experts of other navies, as an exceptionally successful type of warship.

As to the U-boat question, an opportunity is here offered for some famous writer to rise up in refutation of the prejudiced and unjust statements made by Capt. Persius. I will limit myself to emphasizing the fact, which has been proved by practical experience, that with the boats which were then ready our unrestricted U-boat warfare would have been successful if, as Grand Admiral v. Tirpitz advised, it had been started in 1916, and had been persisted in. Even later, under extremely adverse circumstances, we came near to reaching our goal, as is seen clearly by the expressions of the English press.

As regards the article by Capt. Persius, entitled "The Illtreatment of the Spirit of the Fleet," I will not attempt to deny that many blunders have been made. The statement as made by him, however, is a gross and prejudiced exaggeration, and above all he is mistaken when he makes Admiral v. Tirpitz responsible for a poor spirit in the navy.

What may be the cause of Capt. Persius's systematic hounding of Admiral v. Tirpitz, and what he hopes to gain by it, I do not know. I must, however, give expression to my opinion, which is shared by many naval officers of high standing, namely, that it was a great misfortune for the navy and for Germany that during the first two years of the war the forcefulness of Grand Admiral v. Tirpitz was not taken full advantage of, that his influence grew less and less, and that he finally had to send in his resignation. Tirpitz, as no other, measured the political situation correctly. If his advice had been followed, I am convinced that a much earlier peace would have been concluded, certainly one more favorable to Germany.

German writers of the Capt. Persius type are, through the consequences of their carping and solely destructive criticism, largely responsible for the fact that the mighty sacrifices of the German people in this war of defense which was forced upon us have been made in vain, that the spiritual strength and morale of the German defensive forces are so broken, and that so fearful a catastrophe has overtaken the German people.

PERSIUS ON GERMAN NAVAL STRATEGY.

Source: Berliner Tageblatt, 3 December 1918.—(Enemy Press Supplement, Daily Review of the Foreign Press.)

19 December 1918.

Objection has been raised to my last article on our fleet, from both official and private quarters, but nothing definite was brought forward that could have refuted my statements. The substance of my charge, indeed, withstands every test, and if the interest of the people requires

it, I have plenty more at my disposal. It is a question solely of a few "differences of opinion." The defenders of Von Tirpitz say he was a great politician. Thus Capt. Müller writes: "Tirpitz, as did no one else, rightly estimated the political situation. If his advice had been followed, I am firmly convinced that peace on terms more favorable to Germany would have been obtained sooner."

This makes me ask, if Tirpitz recognized the submarine campaign as the means to reduce England, ought he not to have built sufficient submarines, at least during the war? Does not Capt. Müller know the particulars about submarine construction which prove than Von Tirpitz was to blame? Here they are: During the 20 months from August, 1914, to March, 1916, when he was dismissed, Tirpitz gave orders for only 80,455 tons of submarines. V. Capelle from March, 1916, to June, 1917, called for 100,800 tons. Under pressure from Reichstag deputies, i. e., Struve, of Kiel, and through the interposition of Von Bethmann-Hollweg, in spite of Capelle's opposition, 63,506 tons were ordered in June and 93,996 in October. At Von Bethmann-Hollweg's instance, then, more submarines were ordered in one day than Tirpitz had ordered during the whole of 1915. Scarcely had Capelle resigned in September, 1918, when Admiral Scheer called for 333 submarines, totaling 224,280 tons.

Von Müller writes further: "German writers, like Capt. Persius, are, owing to their carping and solely destructive criticism, considerably to blame for the fact that the immense sacrifices which the German people have endured in this defensive war (?) that was forced upon them, have been in vain * * *."

I ask, does Von Müller know that all my articles from the beginning of August, 1914, were subjected to previous censorship and that I might not publish a word which had not been approved by the Imperial Ministry of Marine and the Admiralty Staff? These officers absolutely prohibited many of my articles, and in others proposed important deletions and alterations. In the Reichstag the naval representative remarked: "The work of Capt. Persius is scrutinized by us with particular severity, because abroad he ranks as an expert." Von Müller's accusation, then, is directed against his own comrades, who exercised the censorship in the Admiralty Staff and the Imperial Ministry of Marine.

Again, I am reproached with having wrongly termed the *Emden* and *Sydney* "contemporaries." The *Emden* was launched in 1908 and the *Sydney* in 1912. Small cruisers are built in classes, so that I consider myself quite justified in describing vessels differing by four years in age as contemporaries. However, in the first place the expression "contemporaries" really has no importance, because all our small cruisers, even those that were launched during the war, are furnished only with the 10.5 centimeter gun, while all the British

launched since the year 1909 (with the exception of three) are armed with the 15.2 centimeter gun. Moreover, an officer on the active list, Korvettenkapitän Studt, writes in his book, "S. M. Schiff Karlsruhe" (p. 29): "Had we only had 15-centimeter guns also, beautiful, long, modern weapons, we need not have been afraid * * *." The *Emden* and all our small cruisers are, for incomprehensible reasons, fitted out with only 10.5 L/40, that is, the long 40-caliber barrel, whilst the British small cruisers all have L/50. I could not for lack of space enter into these details, although they are particularly damaging for Von Tirpitz. If the defenders of Von Tirpitz make a point of the expression "contemporaries," I refer, for example, to the armored cruiser *Blücher*, the construction of which was undertaken in the most casual fashion, and the dispatch of which to fight at the Dogger Bank must be termed a crime. The *Blücher* was 15,800 tons gross, armed with guns of 21-centimeter caliber, and launched in 1908. In England the *Indomitable*, *Inflexible*, and *Invincible* had been already launched in 1907. These ships displace 20,300 tons, and are armed with 30.5-centimeter guns. Let this example suffice to demonstrate the equality (?) of our ships as compared with the British. These circumstances—Von Tirpitz's mistakes in construction—were frequently discussed, moreover, in the Berliner Tageblatt before the war.

At times the blame for the unfortunate outcome of the war has been sought in the fact that our fleet, owing to insufficient money grants on the part of the Reichstag, did not come up to the British, and it has been said: "Yes, if only Tirpitz had been allowed to build more big battleships everything would have been different." An admiral answered my objection by saying that however many ships of the line had been built by us, England would always have kept pace, and that with still greater forcing of large battleship construction the war would undoubtedly have come even earlier, "and then our diplomats would have had to show their skill." That the political understanding of this gentleman rendered further conversation unnecessary will be readily understood.

Lastly, it was frequently said that the best proof of the excellence of our navy was furnished by the attitude of the British fleet, which, after the battle at the Skagerrack, never again ventured on a passage of arms. I am of the opinion the British realized that the Skagerrack battle meant an unnecessary waste of personnel and matériel. That was openly stated in the British press, and with it was combined the admonition not to imperil another man or ship, as the final aim would be achieved even without further sacrifice. The result has shown that that was absolutely right.

Two admirals, three captains, two korvettenkapitäne, and two kapitänleutnants solemnly protest in different newspapers—"they

know that the comrades of the active naval officers' corps are in agreement with them"—that I have "generalized" in my strictures on the naval officers' corps with regard to the treatment of the personnel. I have gathered the impression from the immense number of complaints which have reached me since the beginning of this war that, in the matter of improper treatment, exceptions can not be spoken of. This view is shared by a considerable number of active naval officers. The fact that the revolt originated in the navy proves that dissatisfaction among the crews was general.

Without support from the general mass such a rising would never have succeeded. However, that also is "differences of opinion." My training prevents my descending to the level of some of the replies, in which reference is made to "my deliberately untruthful statement" (in reference to the *Emden*) to "Comrade Persius," and so on.

REPLY TO PERSIUS BY CAPT. SCHELBE.

Source: Berliner Tageblatt, 4 December 1918.—(Enemy Press Supplement, Daily Review of Foreign Press.)

19 December 1918.

As a long-standing contributor to *Nauticus* and *Marine-Rundschau*, and as first officer of a modern armored cruiser, in which capacity during the war I superintended the gunnery for two years and took part in the Skaggerak battle, I may be permitted to give an expert reply, so far as the matériel of our High Seas Fleet comes in question, to Capt. Persius's article in the Berliner Tageblatt, which, under the title "How it happened," vigorously attacked the naval direction and the system of our fleet construction. A ship's type is in its complexity one of the most difficult of technical compromises. The German constructors in adjusting weight pursued a middle course in relation to armament, armor, resistance, speed, and bulk. England subordinated protection, security, and resistance to offensive attributes, gun armament, and speed. The touchstone of a weapon is battle. Granted that the caliber of our guns was almost below what was requisite, that with the 10.5 centimeter gun on the small cruiser it did not fully comply with military requirements, still, after our successes in battle, it can by no means be maintained that our matériel was universally "inferior" to the English and "wanting." The material success in battle proves the exact contrary.

In the Skagerrak battle the proportion in strength of the fleets was as 1:2, the proportion of loss in battleships 1:4, in smaller vessels 1:2. Consequently the material success was wholly on the German side. Admiral Lord Fisher was reproached, when the first dreadnaught construction was announced, with these ships being 10-minute ships; that is, they would be overcome in 10 minutes, for they did

not possess the necessary resisting power. That more or less occurred. The battle cruisers *Indefatigable* and *Invincible* were blown to bits some 15 minutes after fire was opened and the battle cruiser *Queen Mary* after about half an hour. Our armament was in effect and accuracy superior to the British. The gun caliber was sufficient. On the German side one large battle cruiser, the *Lützow*, was put out of action, but it sank only during the return. Ships with about 25 severe hits, and very dangerous damage below the water line, got back to the home ports. The *Seydlitz* continued the fight to the end with undiminished speed, although struck by a torpedo in the fore part at the very beginning of the action.

These are only some few examples in striking confirmation of the quality of our matériel. The artillery successes were achieved not, as Capt. Persius says, in thick weather, but mainly during the first part of the battle, when very clear weather prevailed. It is therefore untenable for Capt. Persius to state that in clear weather the outcome of the battle must have been "annihilating" for us, as "the British guns with their far greater range would have shot to pieces our weakly armed ships." The battle of the Falkland Islands can not be adduced as proof that the German matériel was inferior, because in that case ships of the dreadnaught type on the English side were pitted against older ships of the predreadnaught type on the German side. The absolute inferiority of the predreadnaught type in comparison with the modern battleship is an obvious fact, which was apparent in the Skaggerak battle also, when the older English armored cruisers were destroyed. But the naval battle of Coronel is a proof that the older German matériel was also superior to the older English.

That the tactical leadership of the English Fleet was "unskillful" no expert will be willing to grant offhand. If Capt. Persius emphasizes the skillful leadership of the German Fleet, he mentions only one cause of our fleet's brilliant success in the matter of armament. As soon as firing by ship against ship begins, matériel and gunnery are decisive. Both proved superior on the German side. If the English Fleet was so sure of its victory, why did Admiral Jellicoe break off the Skagerrak battle, and not fight it out, which he was quite in a position to do? Why did he not energetically pursue the German Fleet on 19 August 1916 and force it to battle when it was announced near the English coast, where the English Fleet was fully assembled?

Capt. Persius further thinks that "for a year it had been possible to speak of a German High Seas Fleet only in a restricted sense," and maintains this by asserting that a great many ships of the predreadnaught type had been withdrawn from the first battle line, because they had to be used for providing material for submarine construction. In reality the withdrawal from the first line was

effected because the predreadnaught type is universally so inferior that every artillery battle must be regarded as hopeless for the predreadnaught type. For this reason the English did not put their squadrons of older ships in their battle fleet and for the same reason Admiral Scheer, after the experience of the Skagerrak battle, decided to withdraw them from the first line of battle. That from the material of some older ships nickel had been obtained for submarine construction has nothing to do with this withdrawal.

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CONFIDENTIAL

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MONTHLY INFORMATION BULLETIN

15 MARCH 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 March 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

Beginning with this number of the Bulletin a digest of reports received during each month by the Office of Naval Intelligence will be appended. In case an officer has a special interest in any subject appearing in this digest, a copy of the report will be provided him on application to the Office of Naval Intelligence.

GEO. W. WILLIAMS,
Captain, United States Navy,
Acting Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

MONTHLY INFORMATION BULLETIN.

NUMBER 3—1919.

15 MARCH 1919.

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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1919.

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5

GERMAN SUBMARINES U-164 AND U-124 ALONGSIDE U. S. S. BUSHNELL

(Frontispiece)

SUBMARINES.

INSPECTION OF GERMAN SHIPS.

Source: Rear Admiral S. S. Robison, U. S. N.

15 January 1919.

(11222.)

It was decided by the Allied Naval Council that, under the terms of the armistice, only the surrendered submarines were available for detailed technical examination. The surface ships being only interned and not surrendered, it was held that the examination of these vessels should be limited to that necessary in establishing compliance with the armistice terms requiring disarmament, removal of explosives, etc. That inspection was made under the cognizance of the British Commander-in-Chief, Grand Fleet. No United States officers took part in it.

The *inspection of surrendered submarines* began at Harwich 27 November 1918. The yacht *Harvard*, and later the *Bushnell* and *Aphrodite*, were ordered to proceed to that place to assist in this work and to afford living accommodations to the numerous officers and enlisted men who were engaged in it, additional to those regularly attached to the vessels. Owing to the congested condition of the port, convenient berths for the vessels and the submarine under examination were not available, and the work at Harwich was carried out under considerable difficulties. At the request of the Force Commander, the British authorities agreed to transfer to Portland the four submarines in which the inspection parties were principally interested, the American vessels giving some necessary assistance as regards towing, personnel, etc. This transfer was made on 12 December 1918, two of the vessels making the trip under their own power. At Portland not only were the harbor facilities more favorable but there were also available the trained personnel of our submarine force to assist in the work. The work of inspection finished 31 December 1918.

The principle decided upon in order to obtain the most useful information within the time available was that effort should be concentrated upon one vessel of the latest type in each class. The older vessels of the type were to be examined so far as opportunity offered

and commented upon only in regard to important differences. The submarines specially set aside for examination were:

U 164	*U C 105*
U B 148	*U 124*

A complete copy of the report consists of the following parts:

Letter of transmittal:

"Ordnance—German submarines."

"Construction—German submarines."

"Engineering—German submarines."

"Electrical equipment—German submarines."

"Communications—German submarines."

"Medical equipment—German submarines."

"General arrangement—German submarines."

"Ship control—German submarines."

"Photographs—German submarines."

"Miscellaneous information—German ships and aircraft."

In accordance with article 27 of the terms of armistice, all German naval aircraft were immobilized. They are in the same status as interned German surface vessels. There was no opportunity for detailed technical inspection.

With further reference to the German surface ships interned in British ports, if the peace terms require the surrender of these vessels, there will no doubt be an opportunity for the detailed technical inspection, but it is believed that it will be impracticable to obtain complete fire-control information either as to instruments or operation.

The foregoing statements relative to technical information obtained from German surface vessels apply also in less degree to German naval aircraft. If the peace terms require the surrender of some of each type, including lighter-than-air craft, it is believed that considerable useful information can be obtained.

NOTE.—The reports derived from the inspection of German ships are arranged in the Bulletin under their respective headings.

GERMAN SUBMARINES—GENERAL ARRANGEMENT, SHIP AND FIRE CONTROL.

Source: Commander R. C. Grady, U. S. N., and Lieut. Commander G. Hulings, U. S. N.

(11222.)

30 December 1918.

The following article consists of notes taken during a month of inspection of German submarines at Portland and Harwich, England:

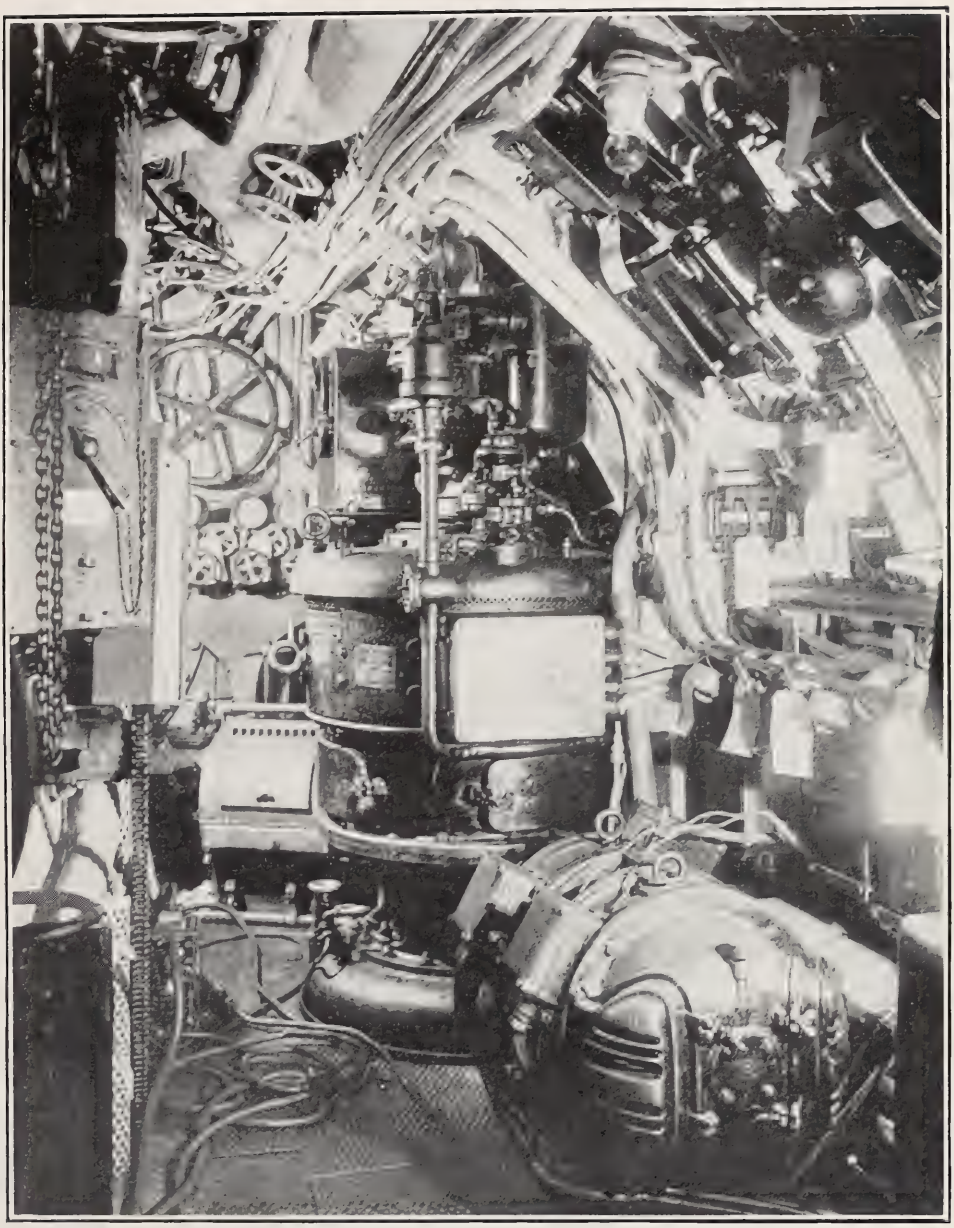
GENERAL ARRANGEMENT.

1. Compartments.

From forward aft.

Torpedo room or mine room.

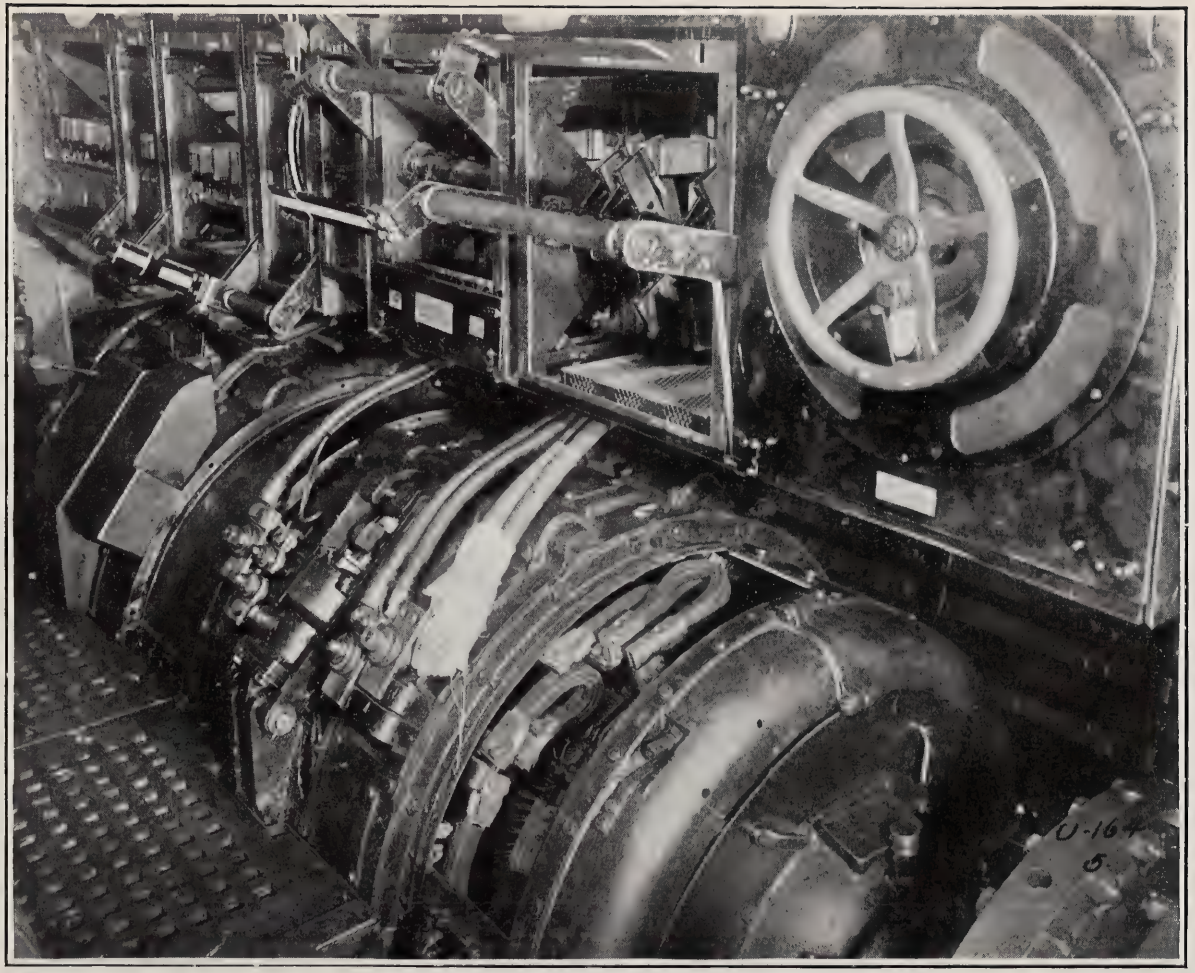
Crew quarters.



6

GERMAN SUBMARINE U-164. LOW-PRESSURE BLOWER FOR REGULATOR TANKS.

Foreground motor generator for Ward-Leonard control for training main periscope.



GERMAN SUBMARINE U–164. STARBOARD MOTOR.

(After motor with lead covers off.)

Galley.
Petty officers' quarters.
Officers' quarters.
Radio room.
Central.
Switchboards and auxiliary machinery room.
Engine room.
Motor room.
Crew quarters.
Mines or torpedoes.

The above arrangement is general for all boats. Slight modifications of the above occur, as, for instance, the auxiliary machinery and switchboards are not always in a separate compartment and the galley is sometimes entirely on one side of the central passage opposite a toilet. In some of the very large boats a shower is combined with a toilet. An ammunition stowage is usually arranged under the central compartment in order that ammunition may be hoisted through the conning tower hatch. Latest boats have a hand ammunition hoist which delivers on deck alongside the conning tower.

2. Hatches.

Large boats have five hatches.

Torpedo room.
Officers' quarters.
Conning tower.
Engine room.
Aft torpedo room.

Smaller boats usually omit the hatch to officers' quarters.

3. Conning Tower.

The conning tower is located over the central area upon a heavy fair-weather water which surrounds the main vents and battery-ventilation outlets. It is large enough to contain three men, the commanding officer, a helmsman, and a voice-tube man.

4. Ballast Tanks.

There is one ballast tank forward and one aft that extend across the ship. The others are divided into starboard and port tanks and range along both sides. In some boats, like the large *U 139*, there are eight tanks on each side. In the *U 53* there are six on each side. Smaller boats have fewer tanks. Amidships are smaller tanks distinctive from the ballast tanks, called regulator tanks, used for compensating. Some of the forward ballast tanks are used for fuel and some of the after ones may be used for lubricating oil. The tanks extend from the keel to the turn of the whaleback deck and are out-

side the pressure hull. All tanks are fitted with vents, low and high pressure air lines, and main pump connections. The vent lines lead from the tanks to a large casting or dome. These castings are outside the pressure hull and in most cases are situated in the conning-tower fairwater, the main vent valve being at the top of the casting and operated from inside the boat.

5. Living Quarters.

The officers have very spacious and comfortable staterooms and the crew have pipe-frame bunks in the torpedo room and also in the forward part of the aftermost compartment. There is also a water-closet forward for officers and one for petty officers; also there is one aft for the crew.

Electric heaters are fitted throughout the boats. The officers' quarters are wood sheathed, while in several other places throughout the boats, notably over electrical equipment, cork sheathing is used.

SHIP CONTROL.

1. Ballast System.

(*a*) *Kingstons.*

The valves are located fore and aft in the boat, each controlled separately, and there is one for each tank.

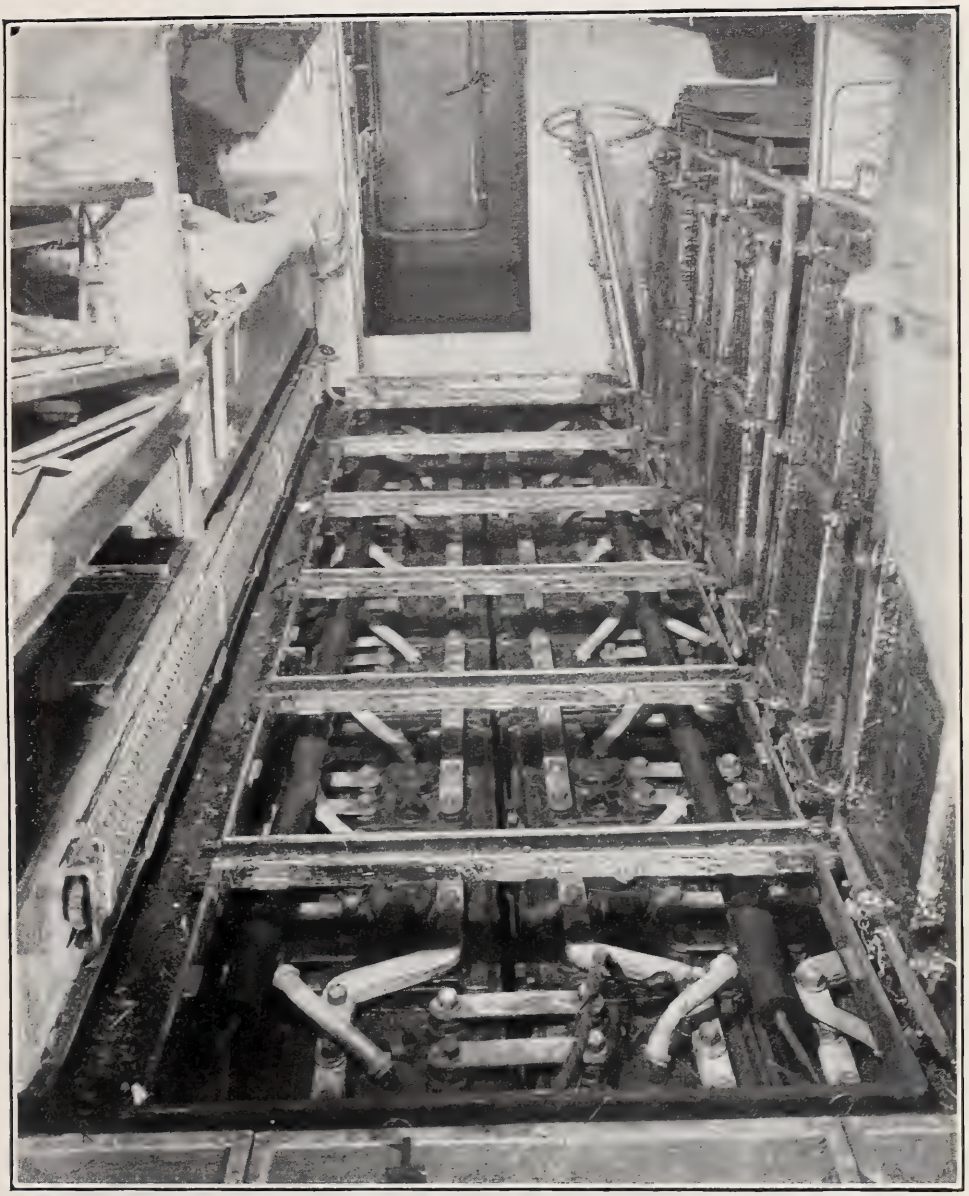
(*b*) *Vents.*

There are either three or four main ballast vents, regardless of the number of tanks. There is a vent pipe leading from each tank, but those pipes join a manifold casting, and all tanks in one group are controlled by one valve in the casting. The casting is usually called a dome. In most boats there are three domes—one forward, one amidships, and one aft. In the larger boats there are two main ballast vent domes amidships—one on the starboard and one on the port side. The grouping of the vents is standard practice with the Germans, because the boats operate with kingstons open and vents closed, and it is thus necessary to open but a few valves to submerge the boat. The vents and vent pipes are as large as practicable, the middle ballast vent dome and valve on the largest boats being about 30 inches in diameter.

2. Ballast-tank Blows.

(*a*) *High-pressure air.*

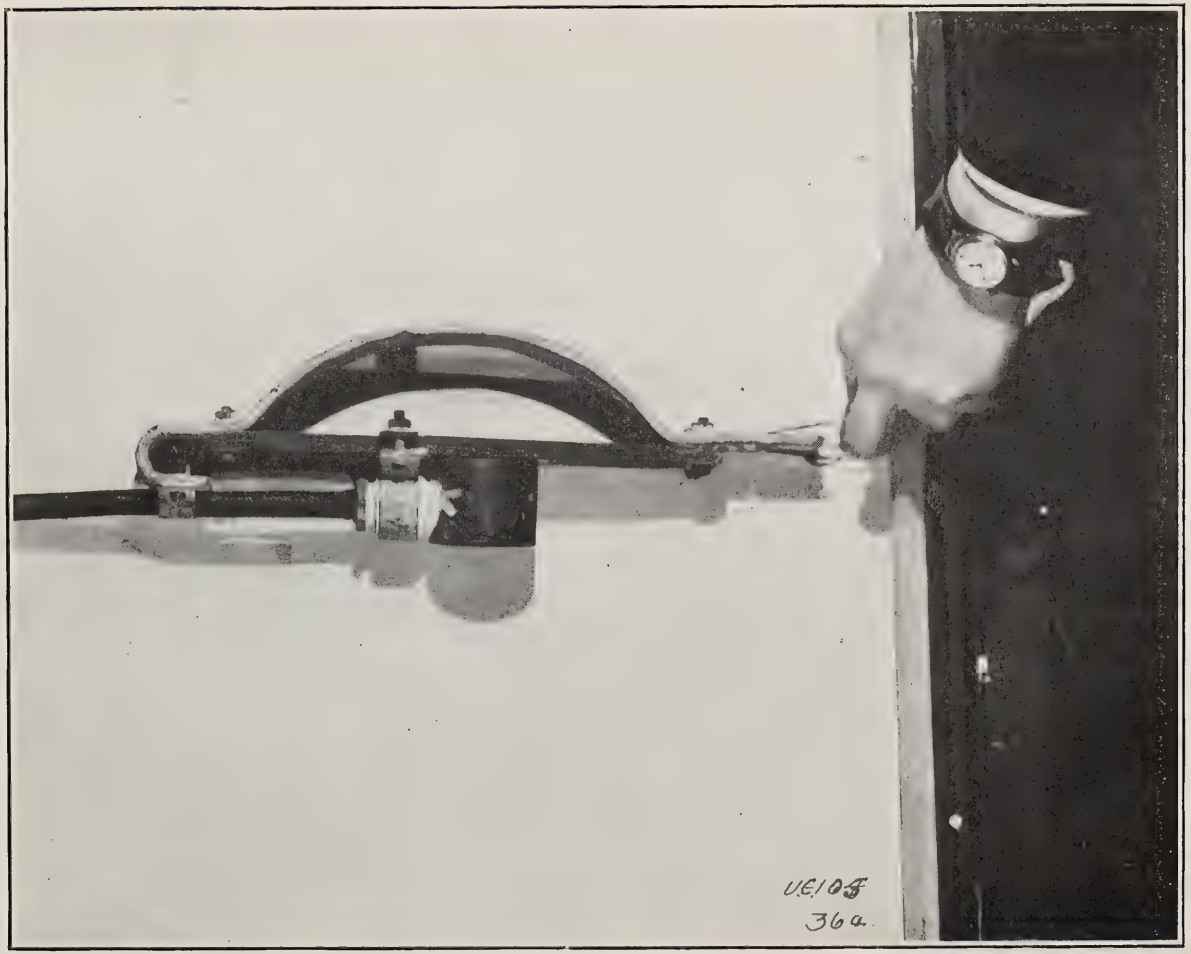
The high pressure is led into the central from air bottles outside the pressure hull. The tank manifolds are grouped together, with three or four tanks and a main stop to each manifold. A pressure gauge connected in the lead to each tank, but instead of being located



8

GERMAN SUBMARINE U-164.

Storage batteries under deck in C. P. O. quarters.



GERMAN SUBMARINE *U. C.* 105. HYDROPHONE.

together some distance from the blow valves, the gauges are connected so as to be right next to the tank blow. In this way it is hard to make any mistake between corresponding valves and gauges. All valves are in central.

(*b*) *Low-pressure air.*

In some boats the low-pressure air lines for blowing tanks are in two groups—starboard and port and cross connected. In the latest boats the low-pressure air lines are all led to one manifold, with a main stop on the manifold. The air is supplied by a motor-driven fan located in the central. All valves are in central.

3. Surface Running.

There are three steering stations, any one of which may be manned for surface cruising, by either electric or hand control. Gyro repeaters on portable leads are placed at these stations. On the forward part of the bridge there is a casting leading into the conning tower and containing a magnetic compass, which reflects into the conning tower. The bridge-control station has no means of communication to the interior of the boat except by voice tube through the conning tower. One officer, one helmsman, and two lookouts occupy the bridge station. Side running lights are built into the sides of the conning tower, and azimuth circles are placed on the bridge. The conning tower and central-control stations have voice tube and telegraph indicator communication to the engine room, motor room, and torpedo rooms.

4. Submerged Running.

The boat is given an initial trim by trial and kept in a proper trim by means of fuel compensating tanks called regulator tanks, containing about 11,000 liters each. Thereafter, upon signal by klaxon or bell from the conning tower to submerge, the conning-tower hatch is closed, the ballast vents are opened, and the boat goes under and can be controlled from either the conning tower or central. The diving rudders can only be operated from the central, but the conning tower is equipped with all the necessary gauges, voice tubes, and telegraphs for ship control submerged. The trim can be adjusted by means of pumping, blowing, or flooding regulator tanks amidships or trimming tanks interconnected fore and aft by means of high-pressure air, turbo blowers, or low-pressure system or main ballast pumps.

The Germans have extensively equipped the conning tower with all gear to enable the commanding officer to control the boat from his station at the conning-tower periscope. There are, however, two other periscopes in central control station.

FIRE CONTROL.

1. Gunfire is controlled by means of megaphone from the bridge. Ready ammunition is kept in deck lockers around the gun. Reserve ammunition is stored in a magazine under central and is served to the gun through the conning-tower hatch or through a special ammunition hoist; in either case, the ammunition is hoisted to the deck by hand.

2. Torpedo firing is done by hand or by electricity from conning tower. The signal to fire is given from the conning tower or central station by means of electric telegraph to the tube.

COMMISSARY.

In the large boats the galley is inclosed on one side of the central fore-and-aft passage and is about 12 feet long. Opposite the galley is a provision storeroom for fresh provisions, about one-third the size of the galley. Vegetables are stored under the floor of the passage in a locker. Bread, wines, and liquors are stowed in separate lockers in waste spaces throughout the boat. Each mess compartment has its own mess-gear locker. In the galley there are four or five electric jacks or receptacles for portable leads. Instead of having a built-in range, similar to American practice, the separate urns for coffee, soup, stews, and vegetables have the heating unit self-contained in the bottom of the urns. Two large frying pans are similarly arranged. Ovens are not usual, but no doubt some of the urns can be utilized as ovens.

GERMAN SUBMARINES—APPROACH INSTRUMENT.

Source: Lieut. Commander H. L. Abbott, U. S. N.

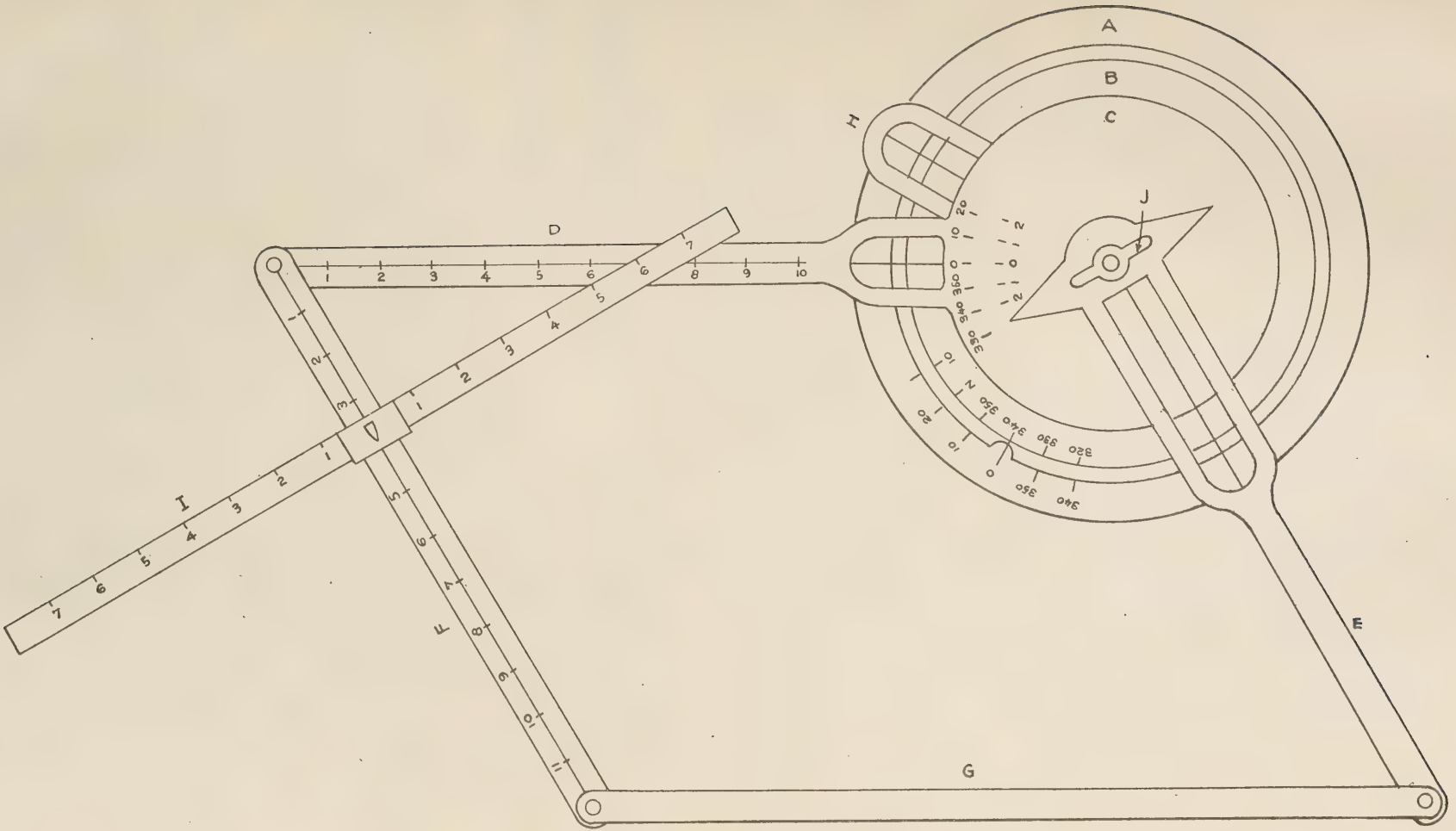
January 1919.

(11222 J.)

The instrument shown in the attached sketch appears to be the standard type of approach instrument furnished to German submarines. It is evidently the instrument referred to in the German pamphlet, "Torpedo Firing from Submarines," Paragraph A VIII (d). (Office of Naval Intelligence, Publication No. 37.)

This instrument is made of metal, with silver metal dials and scales. The actual size of the instrument is nearly twice as large as the size shown in the sketch. The exact dimensions were not measured when the instrument was inspected at the British Admiralty.

Ring (A) represents the periscope circle. This ring is graduated by single degrees from 0° to 360°. This ring turns independently of the rest of the instrument and can be clamped in position



GERMAN SUBMARINE
APPROACH INSTRUMENT

by a thumbscrew underneath. Ring (B) represents the compass card. This ring is graduated by single degrees from 0° to 360°, and is marked in compass points. This ring is rigidly attached to the body of the instrument. The faces of the rings (A) and (B) are flush with each other. Arm (D) attached to disk (C) is the initial target bearing and range arm. Disk (C) turns independently of the rest of the instrument. This disk is graduated by single degrees from 0° at the point of bearing of the target to 360°, and by single points from 0, at the point of bearing of the target, to 16 points each way. Arm (H), which is above circle (B) and under disk (C) and is free to turn independently of either, is another target-bearing arm. Arms (E) and (F) are the enemy course arms. Arm (E) can be locked with regard to compass circle (B) by means of wing nut (J) without locking disk (C). Arms (D), (E), (F), and (G) form a parallelogram. Arm (I) is a distance at right angles to enemy's course arm. This arm is held at right angles to arm (F) in a crosshead, which is free to slide on arm (F). The parallelogram, consisting of arms (D), (E), (F), and (G), is so constructed that arms (G) and (E) can pass over the other arms to bring the attacking ship on the other beam of the target. Arms (D), (F), and (I) are graduated as shown, except that the graduations shown are divided into one-tenths, and the graduations are numbered exactly as shown.

COMPLETE STATISTICS OF LOSSES OF GERMAN SUBMARINES.

Source: Reliable.

1 March 1919.

(9497 F.)

The following statistics are taken from the latest British sources, and give the definite fate of every German submarine. No attempt has been made to describe any of the sinkings, but merely to give in brief form the facts regarding each boat.

I. SUBMARINES SUNK BY THE ALLIES OR AS A RESULT OF THE WAR.

U classes—*5*, *6*, *7*, *8*, *10*, *11*, *12*, *13*, *14*, *15*, *18*, *20*, *23*, *26*, *27*, *28*, *29*, *31*, *32*, *34*, *36*, *37*, *40*, *41*, *44*, *45*, *48*, *49*, *50*, *51*, *56*, *58*, *59*, *61*, *64*, *66*, *68*, *69*, *74*, *75*, *76*, *77*, *78*, *81*, *83*, *84*, *85*, *87*, *88*, *89*, *92*, *93*, *95*, *97*, *99*, *102*, *103*, *104*, *106*, *109*, *110*, *154*, *156*. Total, 63 (*U 97* was sunk on her way from Germany to Harwich to surrender).

UB class—*1*, *3*, *4*, *7*, *12*, *13*, *15*, *16*, *17*, *18*, *19*, *20*, *22*, *26*, *27*, *29*, *30*, *31*, *32*, *33*, *35*, *36*, *37*, *38*, *39*, *41*, *44*, *45*, *46*, *52*, *53*, *54*, *55*, *56*, *57*, *58*, *61*,

63, *65*, *66*, *68*, *69*, *70*, *71*, *72*, *74*, *75*, *78*, *81*, *82*, *83*, *85*, *90*, *103*, *104*, *107*, *108*, *109*, *110*, *113*, *115*, *116*, *119*, *123*, *124*, *127*. Total, 66.

UC class—*1*, *2*, *3*, *5*, *6*, *7*, *9*, *10*, *11*, *12*, *13*, *14*, *15*, *16*, *18*, *19*, *21*, *24*, *26*, *29*, *30*, *32*, *33*, *35*, *36*, *38*, *39*, *41*, *42*, *43*, *44*, *46*, *47*, *49*, *50*, *51*, *55*, *57*, *61*, *62*, *63*, *64*, *65*, *66*, *68*, *69*, *70*, *72*, *75*, *77*, *78*, *79*. Total, 52.

Grand total, 181 (one of which was sunk after armistice).

II. SUBMARINES BLOWN UP BY GERMANS TO PREVENT THEIR FALLING INTO THE HANDS OF THE ENEMY.

(*a*) At Pola or Cattaro:

U classes—*47*, *65*, *72*, *73*. Total, 4.

UB class—*48*, *129*. Total, 2.

UC class—*25*, *34*, *53*, *54*. Total, 4.

(*b*) At evacuation of Flanders:

U classes—none.

UB class—*10*, *40*, *59*. Total, 3.

UC class—*4*. Total, 1.

Grand total, 14.

III. SUBMARINES INTERNED IN NEUTRAL COUNTRIES.

U classes—*39*, *157*. Total, 2.

UB class—*6*, *23*. Total, 2.

UC class—*8*, *48*, *56*, *74*. Total, 4.

Grand total, 8 (of these *U 157* and *U C 74* were interned after the signing of the armistice).

IV. SUBMARINES SURRENDERED TO THE ALLIES.

(*a*) At Harwich:

U classes—*A*, *3*, *9*, *19*, *22*, *24*, *30*, *33*, *35*, *43*, *46*, *52*, *53*, *54*, *55*, *57*, *60*, *62*, *63*, *67*, *70*, *79*, *80*, *82*, *86*, *90*, *91*, *94*, *96*, *98*, *100*, *101*, *105*, *107*, *108*, *111*, *112*, *113*, *114*, *117*, *119*, *120*, *122*, *123*, *124*, *125*, *126*, *135*, *139*, *141*, *151*, *152*, *153*, *155*, *160*, *161*, *162*, *163*, *164*. Total, 59.

UB class—*21*, *24*, *25*, *28*, *34*, *49*, *50*, *51*, *60*, *62*, *64*, *67*, *73*, *77*, *79*, *80*, *84*, *86*, *87*, *88*, *91*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *101*, *102*, *105*, *106*, *111*, *112*, *114*, *117*, *118*, *120*, *121*, *122*, *125*, *126*, *130*, *131*, *132*, *142*, *143*, *148*, *149*. Total, 51.

UC class—*17*, *20*, *31*, *45*, *52*, *58*, *59*, *67*, *73*, *76*, *90*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *101*, *102*, *103*, *104*, *105*. Total, 25.

Grand total for Harwich, 135.

(*b*) At Sevastopol:

U classes—none.

UB class—*14*, *42*. Total, 2.

UC class—*23*, *37*. Total, 2.

Grand total for Sebastopol, 4.

Grand total surrendered, 139.

V. SCHOOLSHIPS AT KIEL.

U classes—*1*, *2*, *4*, *16*, *17*, *21*, *25*. Total, 7.
UB class—*2*, *5*, *9*, *11*, *76*. Total, 5.
UC class—*28*, *60*. Total, 2.
Grand total, 14.

VI. INSPECTED AND REMAINING IN GERMAN PORTS.

(*a*) Kiel:
U classes—*38*, *71*, *136*, *140*. Total, 4.
UB class—*89*, *128*. Total, 2.
UC class—*22*, *27*, *91*. Total, 3.
Grand total, 9.
(*b*) Braunsbüttel:
U classes—*118*.
UB class—none.
UC class—*71*.
Total, 2.
(*c*) Hamburg:
U classes—none.
UB class—none.
UC class—*40*.
Total, 1.
Grand total, 12.

VII. HANDED OVER TO BULGARIA.

One boat, *UB 8*.

VIII. SOLD TO AUSTRIA.

UB *43*, *47*. Total, 2.

IX. FITTING OUT.

U classes—*121*, *137*, *138*, *142*. *143*. *144*, *148*, *149*, *150*, *158*, *159*, *165*, *166*. *167*, *168*, *169*. Total, 16.
UB class—*133*, *136*, *137*, *138*, *144*, *145*, *150*, *155*. Total, 8.
UC class—*80*, *81*, *82*, *83*, *84*, *85*, *86*. *87*, *88*, *89*, *106*, *107*, *108*, *109*, *110*, *111*, *112*, *113*, *114*, *115*, *116*, *117*, *118*, *122*, *123*, *124*. Total, 26.
Grand total, fitting out, 50.

X. BUILDING.

U classes—*115*, *116*, *127*, *128*, *129*, *130*, *131*, *132*, *133*, *134*, *145*, *146*, *147*. Total, 13.
UB class—*134*, *135*, *139*, *140*, *141*, *146*, *147*. Total, 7.
UC class—none.
Grand total, building, 20.

XI. NUMBERS NOT USED IN NAMING SUBMARINES (NON-EXISTING NUMBERS)

U classes—*42*.
UB class—*151*, *152*, *153*, *154*.
UC class—*119*, *120*, *121*.

In the complete list accounting for all German submarines, the cases in which the United States Navy is given or could possibly claim participation are quoted as follows:

U–58, sunk 17 November 1917, 5137 N, 0812 W (U. S. S. *Fanning*).

U–92, sunk 9 September 1918, Northern Barrage (area B) (mine).

U–95, sunk about January 1918; unknown.

U–102, sunk about September 1918; unknown; probably in Northern Barrage (area B) (mine).

U–156, sunk 25 September 1918, Northern Barrage (area A) (mine).

UB–36, sunk June 1917; unknown.

UB–65, sunk 10 July 1918, 5107 N, 0942 W (accident during encounter with U. S. S. *AL–2*).

UB–70, sunk 8 May 1918 by H. M. S. *Basilisk* and U. S. S. *Lyndonia*.

UB–104, sunk 19 September 1918, Northern Barrage (area B) (mine).

UB–108, sunk about July 1918; unknown.

UB–113, sunk about September 1918; probably in North Sea; unknown.

UB–119, sunk about May 1918; unknown.

UB–123, sunk 19 October 1918; Northern Barrage (area A) (mine).

UB–127, sunk about September 1918; probably in Northern Barrage; (area B) (mine).

Of the known cases with which the United States is concerned, the only losses known to have been caused by United States ships are the *U–58*, sunk by U. S. S. *Fanning*, and the *UB–70*, sunk by U. S. S. *Lyndonia* and H. M. S. *Basilisk*.

By the Northern Barrage (impossible to state whether American or British mines) the known losses are:

U–92.
U–156.
UB–104.
UB–123.

Those probably lost in the Northern Barrage:

U–102.
UB–127.

Those possibly lost in the Northern Barrage:

UB–108.
UB–113.

ANTISUBMARINE WARFARE—ANALYSIS OF METHODS OF ATTACK.

Source: British.

January 1919.

(9497 F.)

The figures listed below include German and Austrian submarines. Seven of the submarines sunk were Austrian, while three others were sunk or interned after the signing of the armistice.

Method of attack.	Known.	Possible.	Improbable.
1. Men-of-war, including auxiliary cruisers:			
(*a*) Ram	5	2	1
(*b*) Gunfire	.....	1	7
(*c*) Depth charge	.....	6	3
2. Destroyers and patrols, including armed yachts, trawlers, drifters, and motor launches:			
(*a*) Ram	9	6	5
(*b*) Gunfire	13	23	88
(*c*) Depth charge	35	85	182
(*d*) Indicator nets	1	1	1
(*e*) Modified sweep	1	8	12
(*f*) Paravane	4	5	9
(*g*) Bomb	1	.....	.....
3. Merchant vessels:			
(*a*) Ram	4	8	24
(*b*) Gunfire	.....	7	96
(*c*) Depth charge	.....	.....	.....
4. Decoy ship:			
(*a*) Gunfire	11	42	43
(*b*) Torpedo	.....	.....	.....
5. Submarine, torpedo	18	6	2
5a. Submarine, gunfire	.....	.....	1
6. Decoy and submarine	2	.....	.....
7. Armed smack	1	8	1
8. Mine nets, towed	1	10	5
9. Mine nets, moored	8	8	3
10. Mines	34	10	22
11. Submarine's own mines	5	.....	1
12. Air attack	7	21	65
13. Accident	4	.....	2
14. Strandings	3	.....	.....
15. Unknown	19	.....	.....
16. Blown up:			
(*a*) In Flanders	4	.....	.....
(*b*) In Mediterranean	10	.....	.....
17. Interned	8	.....	.....
Total	210	257	573

Grand total, 1,040.

NOTES ON BRITISH SUBMARINES.

Source: Reliable.

20 September 1918.

(11235.)

(Although this report is some months old, it is thought that the information it contains may be of interest.)

Most of the following notes, especially those on material, were made while operating on H. M. sumbarine *L–1*. The *L* type is apparently regarded as the most satisfactory type of submarine in the British

Navy, and duty on this class is preferred by the submarine officers, although the higher ranking officers are sent to the *K* class. The *L* class is a development of the *E* class, being larger, faster, and more comfortable. They are said to be very comfortable in a seaway, and many who get very seasick in other types say they have enjoyed immunity on this type.

Sleeping accommodations for crew, outside of Chief Petty Officers and Machinists's Mates, first class, are, however, inadequate. One method of saving space was noted, namely, that men's lockers are in seats upon which they sit at the table. Table legs are secured to horizontal flat iron straps, one at each end, two in all, which extend athwartships across compartment. Seats also secure to these straps, so that a certain amount of rigidity and permanency is secured which prevents movement in a seaway. Still more permanency can be obtained, if desired, by securing ends of straps to tank tops.

COMPASSES.

One compensated magnetic compass is installed in conning tower. On some vessels compensation is obtained by four coils, planes vertical, one on each side of the compass, which take current shunted from main battery leads. The amount of current taken is determined by experiment and the apparatus is still in a crude state of development. It has been much more highly developed by the Russians. Compass card and lubber's line are projected on a screen in steering station in control room through 4-inch pipe, in which there are three changes of direction, two of them right angles. The use of a projection similar to this would simplify considerably some of our installations. Conning tower is, of course, of composition.

Gyro compasses are complained of by the British submarine officers generally, and some of them seem to prefer the Anschutz. It is probable, however, that the latter gave the Germans trouble, especially because of depth charges and gunfire disturbances. The commanding officer of the French submarine *Daphne* stated that the gyro-compass installation had given no trouble.

GUNS.

The *L–1* was originally provided with housing 4-inch gun. The gun installation was not strong enough to withstand recoil, and was removed. On later units of this class a fixed 4-inch gun mounted considerably higher up was installed and *L–1* is now undergoing overhaul to receive the same installation.

This gun can be quickly manned and operated in as heavy a seaway as it would be possible to operate it. This installation has the difficulty of adding to underwater resistance. In this connection the British submarine officers do not regard high speed as of such para-

mount importance as has been customary in the consideration of our design, the idea being that you can not go at high speed with periscope up because of the danger of divulging your presence, and with periscope down you are blind.

M–1.

The British *M–1* was seen, but no opportunity to visit her could be obtained. In addition to torpedo tubes, she is provided with a 12-inch, 45-caliber gun which was removed from a battleship. A water-tight muzzle piece is fitted, removable from inside turret. Gun can be trained about 10° on either side and can be elevated. First shot can be fired about one minute after broaching submarine to surface. This vessel is considered to be a successful experiment.

OPERATIONS.

The *L* boats operated on a patrol of eight days at sea. On the way out to patrol area two practice approaches were made on another submarine. The *L–1*, for instance, proceeded to outer harbor, made two practice approaches on submarine *L–5*, and then acted as target ship for submarine *L–5*. During practice approaches, submerged submarine kept after periscope up, with flag attached. Data were kept regarding estimated course and speed of target, firing course, estimated range, and deflection. Target ship also kept record. All records were turned in to escort motor launches, and returned to Division Commander for analysis and criticism during the absence of submarines on patrol. Target ship usually zigzagged during progress of attack. No torpedoes were fired. (In regard to the latter, the latest Admiralty orders are that all torpedoes must be "parted" (broken down) after a run.) Periscope was operated by Commanding Officer and diving and "Is-Was" instrument by the second officer.

After completion of practice runs, submarine anchored and charged batteries, after which she proceeded to billet so as to arrive about daylight. During the day the submarine ran submerged on one propeller, motors in series, about 200 amperes. (In this connection no attempt is made to run at constant kilowatts, but speeds are determined by constant amperage.) Periscope watch was maintained constantly. To accomplish this all officers and all members of the crew who can be spared stand periscope watch, a single tour lasting about 20 minutes. Much longer periods day in and day out are apt to cause injury to eyes. High power was practically always used, and to great advantage. It was noted on a French submarine visited that no high-power periscopes were fitted, and that the Commanding Officer did not value them.

Anti-submarine operations were somewhat hampered by requirement to come to surface at specified intervals during the day for radio instructions and information. During this time and for one-half to three-quarters of an hour afterwards the chance of detecting presence of enemy submarine was practically nil. This could, of course, be obviated by not coming to surface, or by the use of under-water radio.

While operating submerged, lower conning-tower hatch was kept closed when visibility was good and opened when it was poor. In clear weather British dirigibles could be seen through periscope at least 10 miles away. It would seem that the effect of these dirigibles was to hamper anti-submarine operations of allied submarines when employed near areas assigned the latter.

On one occasion the *L–1* submerged to 60 feet because of low visibility and surfaced about an hour before dark for radio. After receiving radio, the Commanding Officer decided to remain on the surface until dark, though with some doubt as to best procedure, going ahead slowly on one motor. During this time he headed to the eastward, which was the direction of lowest visibility. It would seem better, where possible, to head in direction of greatest visibility, in this case to westward, where range of visibility was two or three times greater than to eastward.

On another occasion an enemy submarine of *UC–52* class was sighted on the surface.

The day was oily calm. Operations were hampered by necessity for keeping periscope down when running at 8 knots. If periscope could have been kept up, attack might have been driven home. Enemy submarine was making about 11 or 12 knots. He may have come to the surface to examine one of the outboard bow torpedo tubes, since during the approach a man was seen to go forward for that purpose. When periscope was raised for observation at 11 a splash showed that enemy had just submerged. Before taking periscope observation each time the motors had, of course, to be stopped and grouped down (in series).

Before being ordered to first command, submarine officers spend from six to eight weeks at periscope school. The instruction at periscope schools consists of attacks on attack teacher and actual attacks in a submarine against other submarines or surface craft.

The engineer is generally instructed first in estimation of course of enemy through attack teacher periscope. To assist him in this a small model "Nasmith" instrument is used. (On periscopes of some submarines this instrument with detachable model is carried on periscope in line with left eye. This is considered very desirable.)

As a rule, angle on enemy's bow is overestimated, especially the greater this angle is.

This is not true at long ranges when angle on bow is small, in which case there is a tendency to underestimate.

Having once determined enemy's course, do not change estimate as angle on bow increases, unless there is good reason to believe enemy has zigzagged.

If enemy's course can not be ascertained, head toward him.

After having been given instructions in estimating course, officers conduct attacks in turn on attack teacher, after which they are given in addition attacks at sea. In making attack, closing course of 90° to bearing of enemy is used. If already close in, a course parallel to enemy is taken, or if necessary out away from his track. When parallel to the enemy and at a distance from his course such that firing position will be reached at about completion of turn, the time to turn is approximately 115° plus firing angle, not later. Simulations of speed on the attack teacher are difficult and have not been attempted.

In training on submarines, officers work together in pairs. One officer conducts two attacks in succession, on the first of which a torpedo is fired (set to run deep) and on the second a water slug. The second officer operates the attack instruments (in which practice is quite as essential as at periscope). After completion of two attacks officers change places and second officer conducts two attacks. These two officers are then replaced by two others from target or patrol boats. About 12 attacks in one day are as many as can well be conducted. Torpedoes are set to run 1,000 yards and are picked up by a special surface boat and taken back to port.

It is usually desired to fire on a 100° track angle, which is in accordance with the rule that it is better to be 15° abaft the beam than 5° forward. Using 100° track angle allows for 10° overestimation of angle on bow without appreciable error in result. Estimate of enemy's speed presents greater difficulties. The British submarine service is now working on a scheme to time the passing of enemy across a constant bearing. For this purpose the standard length of 105 feet, bow to some part of conning tower, depending on type of enemy submarine, is used. The main difficulty is to keep periscope on constant bearing when boat is yawing. A gyroscopic apparatus which will enable man operating periscope in azimuth to keep it on constant bearing is being considered. On our submarines fitted with bearing indicators a bearing constant to an accuracy obtained by repeater can be maintained. Tables of corrections for own course and speed can easily be prepared. On certain bearings thumb rules can be followed. As when relative bearing is one-half track angle, your speed must be added to estimate.

If, for instance, 105 feet, submarine's bow to after edge of conning tower passed line of bearing in 8 seconds, and attacking sub-

marine was making 2½ knots, enemy's speed is 8 plus 2½, equaling 10½ knots.

In making an estimate of this kind, an error in previous estimate of course introduces an error in speed estimate which tends to counterbalance error in course estimate. A change of 1° in bearing between readings will, of course, introduce a considerable error.

In the absence of an estimate of this kind, estimate must be based on change of bearing and appearance of bow wave and wake.

It has been the custom to fire four torpedoes at enemy submarine with a spread about equal to length of submarine, the first torpedo about length of submarine ahead of bow, the second at bow, third at stern, and fourth about a length abaft stern. The trouble with this is that the first torpedo, the one the enemy will first see and take alarm, is fired to miss. He will turn away and dive, and second torpedo will also pass ahead. Chances of hits by third and fourth torpedoes are very much diminished by the turning away. A British submarine with very good chances fired three torpedoes and failed to hit, apparently for reasons mentioned above.

To obviate the above, the use of another system of firing, which has been tried out successfully in practice, is contemplated. This is to fire first two torpedoes right and left simultaneously, one set to run straight and hit and other with gyro angled 2°, so that torpedo will diverge ahead, and fire second two simultaneously, one to run straight and hit and other 2° angle to diverge astern.

PERISCOPES.

On the *L* boats there are two day periscopes and one night periscope. The former are 33 feet long, 6 inches diameter, except at top, and are provided with 13 feet of housing depth. This latter is arranged for by a well in control room. This method of housing has, of course, the advantage of obtaining a good distance between upper and lower bearings. The upper 4½ feet of forward periscope is 3 inches in diameter.

This periscope is bifocal 1.5 power and 6 power and can be used as sky searcher. To accomplish latter, objective prism can be swung by steel tape to various intermediate positions. This feature greatly facilitates searching horizon for the various angles of trim or roll of boat. The power shift is mechanical also, by means of lever and steel tape. The use of tape or flat wire instead of round wire has eliminated breaking. This periscope trains very easily in azimuth. Hoisting and lowering is accomplished by means of cables over a drum, which is operated by telemotor system. It seems to work very satisfactorily.

Some of the *L* boat periscopes are made of steel; composition is preferred, however, because of corrosion of steel tubes, especially in proximity of composition bearings.

The value of bifocal periscope for attack purposes is considered very great. All of these things are necessary during the progress of an attack, and they can and should be provided in one periscope.

The night periscope was considered to be too short and had apparently not been used.

Special cloth, "Selvyt," is kept at hand for wiping off lenses and outside lens is always wiped off before submerging.

RADIO.

The *L* boats are fitted with a 1-kilowatt spark set and a 3-kilowatt arc set. For receiving purposes jumper wire is rigged as aerial. Another aerial is provided by fitting cap insulator over after periscope. A larger and higher aerial is provided on housing radio mast. A special arrangement is provided for quickly drying out aerial circuit when coming up from a dive and desiring to transmit.

The underwater radio installed on *E–54* was inspected, and notes obtained from electricians and from pamphlets upon the subject. This apparatus was developed by an officer in the French submarine service and is installed on a number of French submarines. It is understood that it is to be installed on all the *L* boats. The set on *E–54* has received messages from Arlington, and has received messages 1,000 miles with aerial 10 feet submerged.

ALTERATIONS TO RELIEVE EYESTRAIN IN BRITISH SUBMARINE ILLUMINATION.

Source: British.

3 December 1918.

(10262 J.)

The question of eyestrain in submarines has been important. With a view to finding a remedy the following alterations were carried out for trial in H. M. submarine *L–1:*

Lamp fittings turned around and so placed that the source of light could not be seen by men employed on their ordinary duties.

Holoplane glass shades provided to disperse the light.

Substitution of a special tint of paint with a flat surface instead of the usual white enamel.

Black face and white figures for diving gauges.

A dimming resistance in each compartment.

A traversing fan with small supply of oxygen for periscope operator.

Support provided for periscope operator.

Separate switches fitted to each lamp.

The general principles of these modifications are to light the ship more uniformly with less light, to avoid sharp contrasts or glare, to accustom men to work with less light, and to provide more comfort for the periscope loockouts.

H. M. submarine *L–1* has been inspected by Admiralty officers, and the following decisions have been arrived at:

(*a*) To apply the principle of illuminating all parts of all new submarines by reflected light. A new type of lighting fitting is being designed.

(*b*) To provide a dimming resistance and individual light switches where possible in new submarines.

(*c*) To carry out the general principles above outlined in submarines refitting, but not to the extent of rewiring or shifting existing fittings. As much should be done as possible by turning fittings around or providing shades, so as to hide the source of light.

(*d*) To provide black faces with white figures for diving gauges instead of the present ones. The firms supplying these gauges are being communicated with on this matter.

(*e*) To provide and fix a traversing fan to play on the periscope operator in order to agitate the air around his head. Arrangements will be made by the Admiralty in regard to the supply of these fans.

(*f*) To await further reports from submarine *L–1* on the special paint used in this vessel, the seat and the supply of oxygen for the periscope operator.

FRENCH SUBMARINE *NIVOSE*.

Source: Inspection Report.

15 January 1919.

(11208.)

The *Nivose* was authorized in 1909 and completed in 1912, and is of ship-shape form, either double hulled or with saddle tanks, and a raised bridge deck running from bow to stern. From aircraft it would be hard to distinguish this type of allied submarine from a

German U B or U C boat, except that the *Nivose* shows no guns on deck, while the captured U B and U C boats near it all mount at least one fixed deck gun. The structure of the bridge deck indicated a light gun housed in a pit forward on the *Nivose*.

The *Nivose* is 52 meters long, about 5 meters beam, draws 3.2 meters if fully blown and 4 meters awash, and is of about 500 tons surface displacement with 50 centimeters freeboard, the bridge deck rising 50 centimeters higher. Under it are six torpedo tubes, one pair fixed aiming ahead, and two pairs that can be trained on either beam, one set forward and one abaft the conning tower. The gun pit and the main hatch are between the fixed and the movable pair forward. There is another tube in the bow, below.

The hull is subdivided as follows: 1, bow tank; 2, bow tube; quarters for 5 warrant officers and galley; 3, batteries and main hatchway; 4, officers' cabins (Commanding Officer to starboard and two Junior Officers to port); 5, operating compartment under conning tower; 6, engines and clutches; 7, generators and switchboards; 8, quarters for crew of 25; 9, stern tank and steering gear. The engines are rated at 400 horsepower, giving a maximum surface speed of 12 knots, and the motors are rated at 300 horsepower, giving maximum submerged speed of 8 knots for two hours, 4 knots for 12 hours, and 2 knots for 24 hours. The torpedoes are about 3.5 meters long by 35 centimeters in diameter.

The conning tower is small (estimated 7 by 3.5 feet, streamlined) and is set into the outer hull so that only about 4 feet 6 inches projects, but it can be cut off from the operating compartment beneath it by a water-tight hatch. A wind screen is fitted around the top, which can be used as a bridge when cruising, access being afforded from inside by a hatchway.

A periscope is fitted in the conning tower and another abaft it. That in the conning tower is short and fixed in height or was housed on the day of the visit. The after periscope rises 4 meters from the deck when up, and tapers to 3 inches at the top. It houses in the operating compartment (in a well) and is used there. It is raised and lowered by a hand-operated reel and wire ropes led over pulleys to a collar on the tube, but can be turned in azimuth by handles on the prism box, the handles folding against the box when it houses in the bilge well.

The left-hand grip, by rotation and gears, moves the prism box forward and back in its carrier and enables the cross wires to be kept on the target in a seaway. Some camouflaged gunboats and large transports at anchor 1,000 yards away were observed through the periscope and seemed very distinct targets though the camouflage might confuse estimates of speed or range if these ships had been under way.

Under the deck of the operating compartment are the compressed-air flasks and high-pressure air and hydraulic pumps. The only compass noticed looked like a portable magnetic boat compass or gyro repeater, with a 12-inch dial, but in the forward starboard corner of the compartment, back of the conning-tower ladder, was some gear that looked like a gyro master-compass stand. Aft of it was the periscope-raising gear; and aft of that the wheel controlling the hydroplanes and the indicators of depth and dip. The periscope well is in the center line of the gangway, fairly well aft.

No opportunity was afforded to examine the gear on the rear bulkhead to starboard of the doorway, but to port of it are located the torpedo controls and the valves to all the tanks, which can be blown out by compressed air at maximum depth. Along the port wall, looking forward, are switchboards, gauges and indicators, and voice tubes, and on the forward bulkhead, to port of the doorway, is the steering wheel and helm indicator. No helmsman's compass was seen. Arm racks and the switchboard for navigating and signal lights are located on the walls of the gangway between the officers' cabins.

These cabins appeared quite comfortable, and so did the bunks of the men. It is the opinion of the French that their boats are more comfortable than either German or the other allied types, as far as they know them. The complement consists of 1 lieutenant (Lieut. de Vaisseau) (commanding officer), 1 ensign (first class), 5 warant officers, and 25 petty officers and men. The galley below seemed very compact and adequate. At their base they use a portable galley, placed on deck aft.

DESTROYER DESIGN.

DESTROYER DESIGN FOR UNITED STATES NAVY.

Source: Lieut. Commander Francis S. Craven, U. S. N.

December 1918.

(11189.)

(The notes on design that follow have been developed by the author as a result of over five years' service on destroyers—and of war experience at sea on the U. S. S. *McDougal*, together with close observation of British design and with consideration of the peculiar needs of our service in destroyer characteristics.)

* * *

The type of destroyer best suited to the needs of the United States Navy is dependent on the type of fleet of which the Navy is to be composed. This, in turn, depends on the future international policy

of the United States, in which the proposition of joining the much-discussed League of Nations is involved. In the development of the theoretical consideration governing the design of our destroyers it is necessary to consider all these factors. After the type of fleet has been arrived at, the various characteristics of its units will be briefly stated.

It is proposed, first, to cover the theory, then to take up in detail the points in which the destroyers of our present design fail to meet the requirements brought out. In each case the remedy taken in the proposed design to overcome the fault or deficiency will be considered, with full reasons. Finally, there will be included a summary of all features of the new (proposed) design which have not been thus brought out, with statement of the reasons for them.

CHARACTERISTICS FOR THE UNITED STATES NAVY.

The size of our Navy must be dependent on the size of the navy of our enemy. As it can not reliably be determined who may be our most probable enemy, and as reliance can not be placed on having only one enemy at a time, nor in finding assistance to combat any combination of enemies, preparation must be made for any and all eventualities. This would seem to mean that the United States must have the greatest Navy in the world. We are so situated and have sufficient wealth that the realization of this need not be impossible.

As America is building for defensive purposes only, it might be assumed that a defensive navy would be required. Such is not the case. No enemy can harm this country until he can land armed forces on our shores. With the fleet undefeated and at sea, he can not do this. His transports must await the news of the sinking of the fleet before they approach the coast. Then, and then only, will the defensive means come into play. But if a strong offensive fleet exists, the probabilities are that he will never attempt to attack.

An offensive navy consists primarily of an offensive type of fleet. The fleet must, of course, be backed by the necessary bases from which to obtain supplies and in which to refit, and there must also be defensive types of vessels (submarines). But the fleet is the essence of the Navy for offensive purposes.

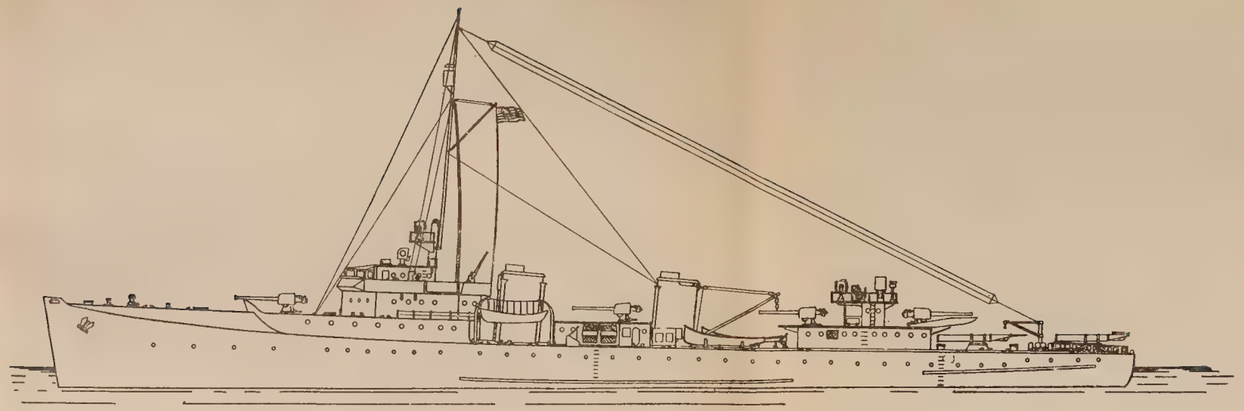
It would be the plan of the Commander in Chief of the fleet to meet the enemy under the most favorable circumstances for defeating him. This is usually considered as a part of "tactics," but for us it can come within the realm of "strategy," by which we are guided in the determination of the types of ships, as will be seen. For instance, as we are the *attacked*, it is obvious that we can choose the circumstances of the battle, particularly as it is certain that the enemy will attempt to defeat the fleet before he dares send out his transports.

A definite policy may be established: "*Always choose bad weather in which to fight.*" With this policy to guide us both in fighting and in design, a fleet can be produced capable of outfighting any other fleet in the weather we shall choose, *because no other nation, with the exception of Japan, can afford to build only for bad-weather fighting.* This is a strategical advantage of our position which can not be overlooked.

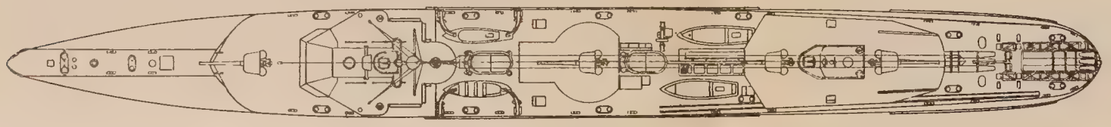
(Note: The reason for this statement is this: Japan and the United States are the only two great powers having no neighbors with sea front on common inland waters upon which a smooth-water high-speed action might have to be fought. Their enemies would have to cross the high seas.)

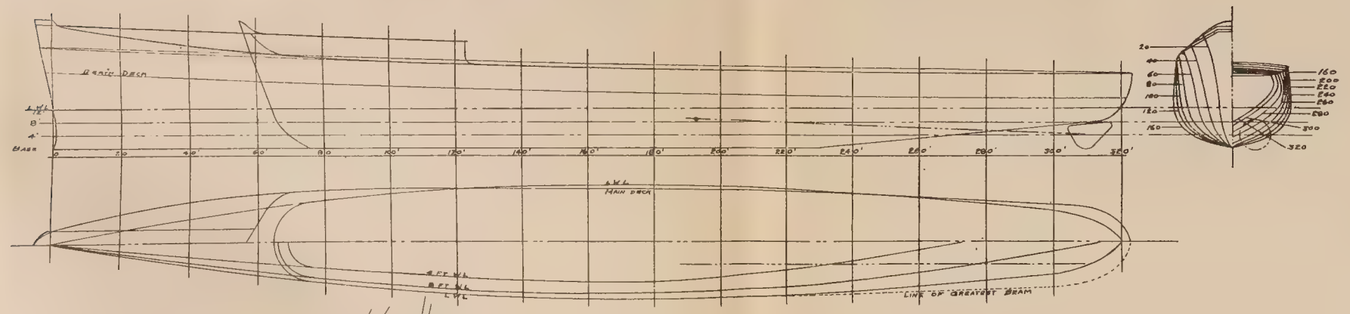
It is now time to consider the elements of this "bad-weather fleet." The essence would, of course, be a main body of "bad-weather" battleships. A fast wing of battle cruisers would be a necessary element, but in this connection it should be recognized that the value of such a fast wing does not lie in its *absolute* speed, but rather in its *relative* speed under the conditions of action. Thus this fast wing would probably be considerably slower than that of the enemy in *smooth water*, but would be faster in heavy weather. Finally a strong force of torpedo craft would be required for protection of the main body against both submarines and enemy craft and to deliver torpedo attacks against the enemy. Needless to say, these must also be heavy-weather vessels, but they must also have other essential characteristics, which will be taken up presently. There remain the "scouts," essentially seagoing vessels of great cruising endurance, and the auxiliary forces, consisting of supply ships, repair ships, oilers, etc., but these are not at present of essential interest. There would also needs be a defensive force consisting chiefly of submarines, and also, perhaps, a body of large submarines, capable of keeping up with the fleet on the surface even in heavy weather, for use in attacking the enemy main body when located.

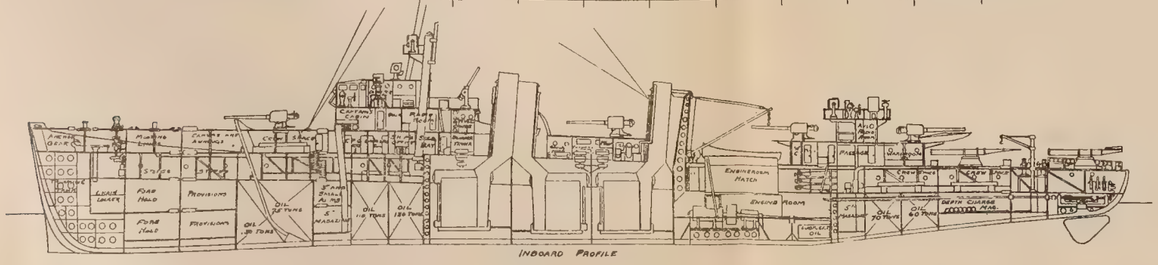
It might be claimed that the principle of building ships for heavy-weather fighting is fallacious in that such an attribute would necessarily involve a decrease in speed in order to obtain the necessary seaworthiness, thus enabling the enemy to bring on the action in his own weather. The answer to this assertion can be found in the old naval proverb that "the speed of a fleet is the speed of its slowest battleship." Thus, the *battleships alone* need be designed for a high, smooth-water speed *in comparison with such speed* of the battleships of our enemies, thereby making it possible to avoid such action in smooth weather and to bring it on at discretion in bad weather. Such high speed for the battleships can be obtained by increase in size, as there is less limit to the size of United States ships than to those of other nations because of her harbors. The Panama Canal can be enlarged if necessary. *Therefore it is not necessary to sacri-*

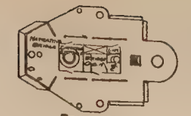


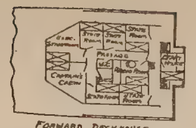
IT IS BETTER TO MAKE 25 KNOTS WHERE OUR PRESENT DESTROYERS CAN ONLY MAKE 15 THAN IT IS TO MAKE 40 KNOTS IN A CALM SEA

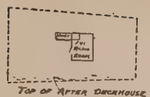


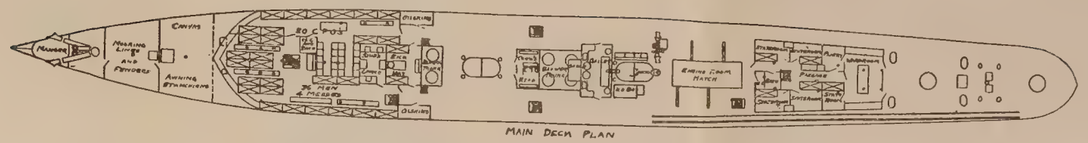


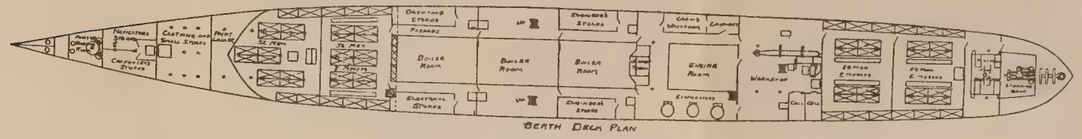


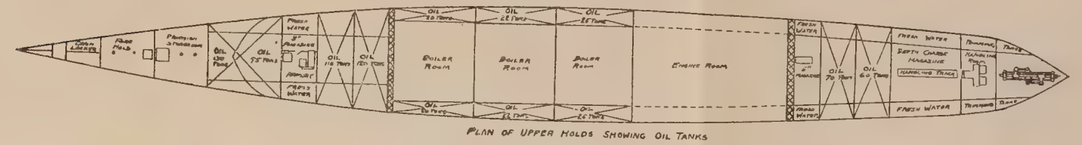


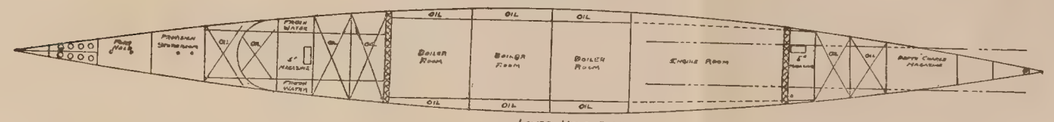


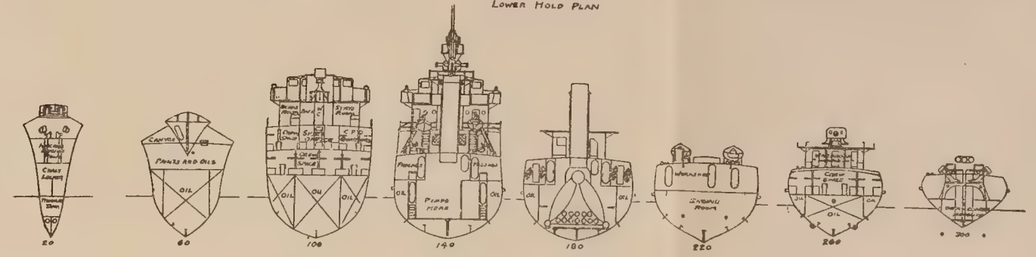












NORMAL DISPLACEMENT	1600 TONS	LENGTH - L.W.L.	320 FEET.
FULL LOAD "	2000 "	" OVER ALL	328 "
OIL CAPACITY - FULL LOAD	700 "	BEAM - L.W.L.	34 "
FRESH WATER CAPACITY	75 "	DRAFT - NULL	12 "
SHAFT HORSE POWER	25000	" - EXTREME	13 "
SPEED - SMOOTH WATER FULL	30 KNOTS +	FREEBOARD - BOW	27 "
CRUISING RADIUS AT 10 KNOTS	9000 MILES	" AT 12.5'	13 "
" " " 15 "	6000 "	" AFT	10 "
" " " 20 "	3000 "	WIDTH OF FORECASTLE FLAT	8 "

ARMAMENT: FOUR 5 INCH 50 CALIBRE SPECIAL DESTROYER GUNS; ONE 3 INCH 50 CALIBRE SKY GUN; TWO 21 INCH TRIPLE TORPEDO TUBES ON CENTERLINE AT STERN; 200 DEPTH CHARGES WITH FOUR PROJECTORS AND TWO RACKS. TWO HOISTS.

COMPLEMENT: 12 OFFICERS AND 178 MEN.

OCEAN-GOING DESTROYER

GENERAL PLANS

SUBMITTED BY

DECEMBER 3, 1913 — FRANCIS J. CRAVEN, LIEUT.-COMDR., U.S. NAVY

fice other essential characteristics in the battleships in order to make them both speedy and very seaworthy.

The aim sought would be to produce a fleet capable of superior heavy-weather offensive power, which would include the elements of heavy-weather speed, offensive power consisting of the most powerful battery arranged for use in heavy weather, and fire control which will be efficient in heavy-weather firing. Then the vessels of this fleet would also require special design, particularly of water-tight subdivision, to enable them to sustain injuries such as perforation of hull by shell fire while operating at speed in heavy weather. Needless to say, they would also require great cruising radius. An enumeration of the essential factors governing the design of vessels of all classes for this "bad-weather fleet" would be as follows:

(1) High rough-weather speed.

(2) Powerful offensive armament.

(3) Protection of armament from weather by means of arrangement and by special design of hull.

(4) Special rough-weather defensive arrangements, consisting principally of internal subdivision of the hull, both above and below the normal water line, to limit the amount of water that can enter from the result of a single perforation.

(5) Special attention to be paid to steadiness of gun platform in heavy weather, including reduction of heel under the influence of the helm, as maneuvering is a useful means of "putting out" the enemy fire control.

(6) Fire control of a form, and fitted with such protection against the weather, as to be most effective in heavy weather.

(7) Great cruising radius for all vessels comprising the fleet proper, and, of course, exceptional radius for "scouts." Cruising radius would include fuel and water endurance, storeroom capacity for food and other essentials, and means of effecting repairs on board ships in any weather.

(8) Means for external communication suitable for use in bad weather, and with auxiliary means in case of damage to the main installations.

(9) Internal communication suitable for use under all conditions of speed and weather. This refers to communications between the extremities of the ship for the personnel, as well as signal communication.

(10) Special arrangements to secure operation of all auxiliary machinery, including particularly ventilating and forced-draft blowers, in all conditions of speed and weather.

SPECIAL DESTROYER CHARACTERISTICS.

The preceding 10 essential requirements for design are applicable to all types of vessels which are to form the fleet. The other charac-

teristics should be considered which must be possessed by the special type of vessel of which this paper is a study.

What must the destroyers which are to accompany the fleet be capable of in the matters for which they are specially designed? Of course, a primary purpose is to protect the main body from the enemy torpedo attack. This means offensive means against both submarines and surface torpedo craft. Another primary purpose is offensive torpedo action against the enemy main body in a general day action or in a night attack. This contemplates high speed, as the success of such an attack largely depends on the speed of the attacking vessels. They must have great maneuvering power, in order to make their attack on the enemy torpedo craft effective. Finally, they must be able to maintain their place with the main body in all weathers and at all speeds. *The last is absolutely essential.* Rolling all these characteristics up into one small vessel, the ideal destroyer is obtained.

On paper this is easy. But in practice numerous difficulties intervene, and soon the result is that our vessel is no longer small, and therefore she loses her value as a torpedo craft (note effect of beam on torpedo tube arrangement later) and becomes a light cruiser. With this increase in size there comes a corresponding decrease in several of her essential characteristics, notably: usefulness as a torpedo boat in attacking the enemy main body, maneuvering ability, and ability for quick action against submarines. Already at least one characteristic has been lost which can not be sacrificed, that of offensive action against submarines.

It would appear that the idea of combining these characteristics into a single vessel should be abandoned and the old theory of TORPEDO BOATS and TORPEDO-BOAT DESTROYERS should be re-adopted.

The TORPEDO BOAT is for the purpose of making high-speed torpedo attacks against the enemy main body by night or day. She *must* have extremely high smooth-weather speed and *small size*, to obtain which she sacrifices cruising radius, gun power, anti-submarine offensive power, and, to a considerable extent, seaworthiness. Of course, she must also have extreme torpedo offensive power. This, fortunately enough, is favored by small size, due to the fact that center-line tubes require a narrow vessel for their best use. A more detailed consideration of this type of vessel will be taken up later.

Coming now to the characteristics of the DESTROYER, she must, first of all, ALWAYS BE THERE, as the primary purpose of this type, if TORPEDO BOATS also exist, is to protect. Thus seaworthiness at high speed and cruising radius are her first essentials, particularly as she is associated with a main body of similarly great

heavy-weather ability. Now, as to her rôle of protection, except at night or in misty weather and when the near presence of the enemy body is known, she has chiefly to protect against the submarine, the capabilities of which have been well demonstrated by the war, and which may be expected to undergo improvement in the future.

Protection against the submarine lies entirely in offensive action against the submarine after its presence has been determined. It includes determining the presence of the submarine or else in preventing the submarine from taking a position for attack. The latter requirements contemplate listening devices and good lookout, which latter is a matter of training of personnel, and good tactical disposition of forces, and which does not come within the scope of this discussion. The offensive means must be considered. At present these are depth charges and the ram, directed by listening devices. It is probable that these will still be the chief means for vessels *on the high seas* for some time to come, though the types of depth charges and the means for laying them will undoubtedly improve with time. Therefore the DESTROYER under consideration must be provided with extensive facilities for "listening," for laying a barrage of depth charges, and for the use of the ram. The next element of protection lies in warding off the enemy surface torpedo attack, both by day and night. Here the means are gunfire and the ram (indicated by British methods in the war), though in the case of the ram the vessel must be designed to sustain the shock and to proceed at speed thereafter, else she sacrifices her own utility for only one of the enemy vessels, which is doubtful practice under the circumstances. Anti-torpedo-boat gunfire should have the essential characteristics of great volume. This contemplates a number of guns and also a high rate of fire.

It would be well to divert here for a moment to point out that the type of vessel that has been described so far is also the type that would be most useful in convoying operations—the protection of fast merchant vessels and transports, and of naval auxiliaries. Thus she would also have to combat submarines on the surface at long range, as exampled by the case of H. M. S. *Perth* in the war. This is in connection with the consideration of the type of gun with which to arm the vessel.

It is now obvious that the guns must be of long range and of the greatest possible size, yet they must be capable of a high rate of fire, and they must be such as to allow ready handling on a vessel of the destroyer type. The question of kind and form of ammunition enters into this, as does fire control, which must be of a type favoring both short-range and long-range work.

The DESTROYER, however, must possess some sort of offensive torpedo armament, for use in case of an unexpected opportunity

through poor visibility, or in case a torpedo attack is imperative and the TORPEDO BOATS are not present through bad weather.

A final requisite for the type, both to assist in combating submarines (for which purpose it is essential), and for combating surface craft as well, is maneuvering ability.

It has been shown that a fairly large vessel of great seaworthiness, great cruising endurance, great rough-weather speed, great gun and depth charge armament, special hull subdivision for ramming and for injuries due to gunfire, and with very moderate torpedo equipment and smooth water full speed is required. These two latter characteristics are the *necessary sacrifices* which have been made to obtain the preceding necessities, and which are justified by the construction of another type having these as its primary characteristics (the TORPEDO BOAT proper).

PRINCIPLES OF DESIGN FOR "BAD WEATHER" DESTROYER.

Under this head it is desired to discuss the governing principles by which some of the foregoing essential characteristics may be obtained.

Seaworthiness should be the first consideration. For a vessel of light construction it is necessary to keep "green seas" off her forecastle deck if she is to proceed at speed. This has been demonstrated again and again in the convoying operations of the war. It is principally due to the fact that green water coming over the bow and remaining on the forecastle for a few moments introduces a great additional weight which must be lifted by the bow of the vessel as she rises to the wave passing aft. This involves a very severe structural strain, which is bound to cause a rupture of the hull girder if carried far enough. This fact is probably the cause of slowing down in most cases with our present destroyers. To keep green water off the forecastle it is necessary to have a very considerable freeboard forward. This freeboard is not an absolute quantity (so many feet), but it is a relative quantity depending on the length of the vessel. We should, therefore, keep our destroyer short and increase her freeboard as necessary, as her principal difficulty in maintaining her place with the battleships will exist in weather which does not materially inconvenience them because of the short length of the seas. Having increased the freeboard to the greatest practical amount, the next step is to assume that seas are coming aboard even then, and so to design the forecastle that it will free itself of the weight of water in the least possible time. Another thing meriting consideration in this connection is adequate protection for the bow gun. Protection for the armament will be considered in detail shortly.

The next consideration for seaworthiness is the form of the bow. It must not have too much "flare," because this causes pounding, due to the rapid immersion of an increased section as the vessel plunges. However much it may be considered desirable to eliminate spray by the introduction of the flare, it must be realized that pounding is destructive of morale, and also that it introduces local structural strains bound to cause damage. Likewise, the vessel must not be too "fine" forward, as such a vessel will be slow to rise to a head sea, and so will tend to bury even an increased freeboard. Therefore a rather full entrance with slight flare is the aim. Incidentally a full entrance tends to eliminate flare automatically.

Other similar elements affecting seaworthiness concern the freeboard in the waist, which must be sufficient to afford protection to deck gear and boats and to make the decks habitable in so far as possible, and the freeboard aft, which is of importance in a following or quartering sea when a depth charge armament must be used.

The final consideration, however, and one not less important than the form of the bow, is the girder strength of the hull. Very special arrangements must be made to secure a hull of exceptional fore-and-aft strength, to enable the vessel to be driven.

Cruising radius is a factor not well coordinated with high-power machinery. In fact, it can not be obtained in any degree in a vessel of the destroyer type as at present designed unless excessive size is allowed. It so happens that the general duties of this type of vessel (as here defined) do not require the exceptionally high, smooth water speed given the present American destroyers. A much less speed in smooth water will suffice, *provided the vessel can make a speed 5 or 10 knots in excess of that of the main body in any weather in which action might take place.* This will insure a considerable superiority of speed in *rough weather* over any other type of torpedo vessel in existence or likely to be designed. The vessels can therefore be designed for a very moderate smooth water full speed (according to present conceptions of high speed) and so produce engines capable of economical operation at low speeds, which will be the usual cruising speeds of the fleet. The next step is to provide adequate fuel and water capacity, water-producing equipment, storeroom space for food, clothing, medical supplies, spare parts, and all other essential material needed for maintenance for extended periods away from a base. Finally, if special arrangements are to be included for fuel economy at low speeds in the nature of cruising turbines, etc., care must be taken that it is not required to stop the main engines to throw them out, but rather that they can be thrown out while the engines are being speeded up for anti-submarine measures.

Maneuvering ability includes rapid acceleration or deceleration of speed on short notice, and the ability to turn quickly. The former

is obtainable through development of oil-burning boilers, and is not a matter which will be discussed here. The latter is largely a matter of stern design. It includes the use of a large rudder and of arrangements for handling the rudder rapidly and powerfully. But its essential requirement is for a stern of a type which will not "drag" in swinging (for a destroyer must swing very considerably in turning) and which will not defeat the attempt to turn by the interposition of a great area of deadwood in the vicinity of the rudder and propellers. The British accomplish this result very successfully by the use of a very flat motor-boat type of stern with an underhung rudder of the "spade" type. It is not feasible to take the chance of pounding offered by this flat stern in a vessel of paramount seaworthiness. The solution would seem to be the use of the underhung "Spade" rudder, the elimination of deadwood, but the use of a compromise between the flat and the hollow V stern, namely, the "canoe" stern.

It is desirable to complete the features of the hull before taking up the armament:

In the first place, provision must be made for the use of the ram, as British experience against both submarine and surface vessels is too conclusive to admit of neglect. This would seem to include both the provision of a bow adapted for ramming, and for one strong enough to stand up under the ordeal. But it also must include arrangements to localize the damage suffered by the ramming vessel, and to enable her to proceed on the high seas after her encounter. This is obviously a matter of hull design. It will be elaborated later on in the discussion of the details of the proposed design.

Hull subdivision to limit damage received in action is the next consideration. This involves the use of small compartments in so far as possible and the reduction of all openings through bulkheads near their lower ends, where hydrostatic pressure would become severe in the event of flooding.

The need for freeboard and, as will be seen, for high gun positions, together with great fuel and storage capacity, yet with small size, are the conclusive reasons for reducing the full speed requirements of the type, in order that the weight saved may be devoted to increasing the beam and the weight of the hull material. The increase in beam *is necessary* for stability in view of the great height of various heavy weights.

The primary importance of depth charge facilities entitles them to priority over the guns. The depth charge arrangements must, first of all, be unimpeded by the operation of any other essential feature of the ship's equipment in time of action. Also, by their very nature, they must be aft. Future developments will require a large increase in handling facilities, and the need for cruising radius will require a

large capacity. A special depth charge magazine, therefore, must be situated aft, with suitable power hoists, and with jury means for getting the charges up if the hoists fail. Loading arrangements must also be provided, such that we can lay a barrage of the most effective type in any weather. Incidentally this requires a better type of "projector" than any now in use in the United States Navy, not so much as regards range, for several vessels will be present to work in unison, but rather as regards rapidity and ease of loading. (Note arrangement in attached plan.)

The guns are of next importance. They have priority over the torpedo equipment *of this type.*

The first consideration is center-line arrangement for several logical reasons; this being a matter upon which opinions differ they will be given in full:

(1) In a type where weight carried is of such extreme importance it is not feasible to "waste" guns.

(2) With the center-line arrangement a gun well aft can be given a better safe angle of ahead fire than is obtained with the present waist guns in the flush-deck vessels. This is because of the blast effect on the bridge of guns so far forward.

(3) To create the greatest volume of fire in repelling a torpedo attack or in protecting a convoy it will be essential to bring every available gun to bear. To do this the enemy can be brought on a bearing of 30 degrees on the bow. If ahead fire is required, resort to the expedient of the double gun. The double gun may prove an advantage in director firing in any case.

(4) Waist guns are continually suffering damage through interference with other vessels in docking and they are not well protected from the action of the sea.

(5) As waist guns are generally located abreast of each other they both probably will be put out of commission by a single effective hit.

The next matter to consider is the protection of the guns from the action of the sea. This includes both green water and spray. Green water will actually deform very heavy metal fittings, and therefore it must be kept from the guns. In the case of the bow gun this is a matter of hull design. In the case of other guns, it is best accomplished by locating the guns on platforms clear of the main deck so that the sea will never reach them. This is a strong reason for the location of guns on deck houses well above the main deck, another reason being that grouping the guns at the same level is advantageous for director firing, and also it improves the visibility from the gun, allowing the greatest efficiency of individual fire. Also, it keeps the guns clear of the other forms of armament and of the ammunition supply.

Ammunition and ammunition supply are features requiring special arrangements. With guns of high power it would be advisable to remove the shell from the cartridge case, loading them separately, but a cartridge case should be used for reasons as follows:

(1) It facilitates "naked" stowage in ready ammunition racks near the guns. This stowage has been proved by practice. It gives instant readiness.

(2) It is more easily handled on a badly shifting deck because of its greater convenience and solidity.

(3) It is more quickly broken out of its container when hoisted by power from the magazine, and it would lend itself to stowage "naked" in the magazine, or else in special fixed tanks secured in the magazine, thereby facilitating the rapid supply of ammunition by hoist.

(4) The powder will not deteriorate through retention in the greasy bore of a continually loaded gun.

(5) The cartridge case acts as a rammer for the shell if necessary, thereby increasing the rapidity of fire by decreasing the time required for loading.

The shell stowage can be chiefly on deck, as has been found practicable in the British destroyers. This requires protection from the sea by good gun location.

Power hoists for the powder should be incorporated in the design because of the high positions of the guns, and the inadvisability of having such extensive amounts of ready ammunition on deck as we now do. In a gun action at close range the present destroyers would suffer greatly from this.

The torpedo equipment for offensive work can now be worked in to take advantage of the space left by the other equipment. Here again the question of centerline arrangement is brought up and again the decision should be in its favor for the following reasons:

(1) It is not good practice to devote weight to torpedo tubes which find their usefulness only on one side of the ship.

(2) Experience, both the American and the British, is to the effect that CLAMPED TUBE FIRING is the best for several reasons, including unification of control and responsibility, reduction of the human links in the chain and of the individual duties required of each, location of the control on the bridge in touch with the commanding officer; and the greater ease with which the ship can be handled to suit the conditions of firing, etc. It is essential for laying a "spread." The ability to see the target better is another consideration. *Fixed tube firing makes it of less consequence to have a wide arc of train*, and therefore the disadvantages of center-line tubes are considerably diminished.

(3) It is impossible to train the present waist tubes outboard at all when making high speed in a heavy sea. That is, they can, of course, be trained out, but the probabilities are in favor of their being wrecked and of the carrying away of the training gear.

(4) If located in the extreme stern the tubes when trained out do not interfere with the gangway or with the service of the guns unless firing dead astern. Neither will they interfere with the depth charge handling if installed as indicated on the plans of the proposed type.

The selected location aft has several very real additional advantages. For instance, the vessel in making her approach for a torpedo attack naturally would proceed head-on, or nearly head-on, during which time the torpedo battery officer at the tubes would be making his final preparations. With this location he would be enabled to oversee the work of both tubes at one time, he would be assisted by the lack of excitement resulting from being away from the activities of the approach, and *he and the tubes would be well protected from the weather.* Finally, the torpedoes having been fired, he might be able to reload the stern tube from spare torpedoes ready on trucks on the track on the port side, thus allowing a second discharge during the retreat. This track, together with its trucks, is so designed that the torpedoes are carried at the proper level for loading in, the truck being provided with a turntable carriage and also with retaining wheels so that it can not leave the track. Spare torpedoes would have to be carried in order to accord with the plans for a great radius of action, and this stowage would have to be in a protected place. Also facilities should exist for overhaul of torpedoes under cover on board.

To insure endurance in heavy weather it is necessary to provide for the supply of the air for the boilers and also for the ventilation of the crew spaces and of the engine room. Adequate means must be provided to lead all air intakes and discharges to such points as will insure their being clear at all times, and steps will have to be taken to ventilate the engine room when it has become necessary to close up the engine-room hatch.

CRITICISMS OF THE PRESENT DESIGN AND REFERENCES TO PROPOSED DESIGN.

It is now time to come down to definite criticisms of the present destroyer design, and to refer to the changes made in the proposed design to overcome the faults developed.

In the first place the present design aims to be a combination of the two types of TORPEDO BOAT and DESTROYER with the TORPEDO BOAT feature emphasized. This has resulted in a very

light hull construction to obtain necessary weight for engines and boilers, etc., and in very disappointing fuel capacity. This is considered the greatest defect in the design.

The present United States boats are woefully weak in sea-going ability. Many officers will claim that, because they are all afloat at the end of the war, this can not be the case. Actually these boats were forced a number of times during the war to slow down and leave important convoys because, in the opinion of their commanding officers, they were being forced beyond their capabilities. In the proposed design the freeboard is increased 7 feet at the bow, on approximately the same water-line length, and the first 60 feet of forecastle deck is "turtle-backed," with only an 8-foot flat, so that a green sea would be shed overboard as quickly as possible. Finally, a solid breakwater is built up, so anchored as to be proof against demolition, abaft of which the forecastle widens out into the full beam, providing an adequate platform for the bow gun, and also adequately protecting it and the forward deck house. There should be no more sheets of green water pouring over the break of the forecastle with such a design, nor should there be further damage to the front of the forward deck house.

Except in the 750-ton boats, our vessels have too narrow an entrance and too much flare. In the proposed design the entrance is full and the flare is very slight in comparison with present vessels. Pounding should, therefore, be greatly reduced.

The "flush-deck" type have, if anything, excessive freeboard in the waist, but not enough aft to adequately protect the depth-charge equipment. Also, the type of stern is such as to have very little flotation, with the result that it "submerges" readily. Finally, the propeller guards throw spray at high speed in a roll, which proves annoying to the personnel. In the proposed design the freeboard aft is 2 feet greater, and the form of stern is such as to eliminate the propeller guard altogether, to provide great flotation, and also a good working platform for the personnel, and to afford the best possible protection for the depth charge and torpedo equipment from damage in collision.

Lack of girder strength is an essential fault with our present boats, although the "flush-deck" type are an improvement in this respect over the older boats. Reliance is placed on narrow girders carried under the main deck over the boilers and engines, with tapered ends fore and aft, supported by stanchions, but these girders are nowhere strong enough to make the job of forcing the vessels a pleasant one in a sea. The proposed design has this feature of girder strength very completely developed. There are two systems. The upper system, carried by the main deck, consists of girders of the depth of a full deck. In other words, there are wing passages over both fire-

rooms and engine rooms, the vertical walls of which form girders of great strength. Forward and aft of the fireroom and engine room spaces these girders are tapered down in the proposed design, and are carried on by means of a system of vertical and diagonal stanchions. The lower system consists of similar vertical girders extending through the firerooms on both sides as the inner walls of oil tanks. At their bottoms these walls form one of the longitudinals of the hull. Where they pass forward through oil tanks forward of the boiler rooms they are continued as vertical bulkheads for subdivision purposes. In the engine room they are tapered to form longitudinals, supported from the flat of the wing passageways by appropriate stanchions. Abaft the engine room they again become full height fore and aft bulkheads in order to support the undercut stern, and also to increase the longitudinal subdivision. This is the method of supporting the stern of the large British "leaders" which are very much undercut, and for a considerable length. The undercut length in the proposed design is 90 feet.

In the proposed design there actually exist provisions for the stowage of 700 tons of oil, and 75 tons of fresh water. With the economy which can be expected from the low-powered engines of this type of vessel (comparatively speaking) cruising radii should be attained within the claims made in the table at the foot of the plans. Thus the vessel would not be a hindrance to the movements of the fleet.

Lack of maneuvering ability is another major criticism of the present designs. It is quite probable that the reason our destroyers have only one definitely sunk German submarine to their credit in the war is due to the fact that they could not maneuver quickly enough. This is not a case of quick acceleration of speed, which we now have, but of inability to turn. The form of stern is the cause of this inability, and the form seems to have been dictated by the requirement for speed. Attention is especially requested to the turning ability of the proposed design. The "canoe" stern does not tend to force the water directly downward, sweeping over it in turning, as does the "hollow V" type in use on the present United States boats. Nor will this canoe stern pound in a seaway as will the flat stern of the British. Its other advantages have been considered previously.

Our experience in ramming so far has been largely the result of accidents. Just how well the American boats would stand up under an encounter with another destroyer at high speed, or with the heavy hull of a submarine, is problematical. But, as previously indicated, it is imperative to provide a special subdivision forward which will admit of ramming with impunity. The breakwater for the bow gun, already referred to, is continued down through the ship to the keel in the form of a curved "bow-shaped" bulkhead. It is recognized that this bulkhead would be an expensive and difficult addition to the ves-

sel, yet its value as "insurance" would be well worth the extra cost and trouble. To facilitate installation it is so designed as to come tangent to the hull at the same frame all the way down. It has only one opening through it, a small door in the port side above the main deck, which was cut for the purpose of making the forward storeroom spaces accessible at sea.

The next major criticism is the faulty disposition of the guns. It is believed that the present arrangement of waist guns was for the purpose of obtaining ahead fire. Theoretically, with the flush-deck vessels there is an ahead fire of three guns. Actually the ahead fire is only one gun, for the following reasons:

(1) Yaw makes it impossible to fire the three ahead, except in the smoothest weather, and then only with an expert helmsman. This, of course, is a consideration *from the standpoint of structural practicability alone.*

(2) Blast effect on the bridge renders the firing of the waist guns within 15° of the bow a dangerous matter and of doubtful advisability, because of the interference with ship control.

There are other considerations which, taken with the foregoing, render the center-line arrangement practically mandatory. Other faults with the present arrangement are: The guns are not well protected from the sea (except, possibly, the waist guns, which are high), because the sea can reach them "green." They are on different levels, thereby rendering control by director firing more complicated. In the proposed design the guns are all in the center line; they are all practically on the same level; they are all protected from the action of the sea by being well above the main deck and inboard; they all have excellent arcs of fire, particularly No. 3 for ahead fire; they all, with the exception of No. 2, have excellent ammunition supply arrangements by direct hoist; they all have ample operating room without obstructions; and, finally, none is located where it can receive damage in docking. With regard to No. 3 gun it is structurally able to fire 7° on either bow, but probably would not be fired closer than 10° on the bow. The other guns all have practical angles of fire within 25° of ahead or astern, and there is a blast shield for the aftergun to protect the fittings on the main deck when firing dead aft. This shield is similar to those fitted to British leaders for their superimposed forward and after guns.

The guns at present on United States destroyers are faulty in several particulars, as follows:

(1) They are unbalanced, thereby putting undue wear on the elevating mechanism. This lack of balance is due to the location directly *below the trunnions* of the center of gravity of all parts carried by the trunnions, which would cause the gun to "level up" should the restraint offered by the elevating mechanism be

removed. Thus, to elevate to a high angle, a strain must be put on the entire elevating gear. *To keep elevated* to this high angle in a roll, this strain *must be maintained* while manipulating the mechanism, thereby introducing cause for wear and also putting an extra load on the elevating pointer. The correction of this fault is obtained by the British through the location of part of their recoil mechanism and other weights on top of the gun.

(2) They are too long in the breech and in the recoil, thereby rendering high elevation, *now required*, impossible. The need for high elevation is to drive down a submarine making a long-range gun attack on a convoy, or to interfere with a submarine gun attack on a merchantman taking place over the horizon.

(3) They are percussion fire, thus rendering them inherently unfit for use with a director firing installation. It will not prove satisfactory to try to fire such guns electrically through the agency of a solenoid. All the evils of electric firing are thus admitted, and in addition there are the worse evils, from the director firing standpoint, of uncertain and variable lag in the firing mechanisms, causing irregular firing intervals at the various guns, and the danger that the solenoid plungers may become "frozen" in place.

(4) They are fitted with improper spray shields, if any. The British spray shield for destroyer work is a small overhead shield carried by the sleeve, therefore elevating and depressing with the gun. The muzzle of the gun just fills the aperture, and no spray is admitted through it. As for the sights, they are located with their axis of elevation relative to the axis of the bore, as close as possible to the shield, so that the aperture for them is also very small. The shield does not extend much below the waists of the men at the sights, and is for spray protection of the sights, electrical gear, and the men's heads and faces, for which purpose it is very effective. Due to its small size and high location it is more readily and strongly supported by the gun and is, therefore, less likely to be deformed by the action of the sea.

In the present destroyers there is no provision for hoisting ammunition out of the magazines except by whip. This method gets the charge on deck *in its case* and the removal of the charge from the case is a matter of some seconds, requiring the attention of a couple of men, after which the case must be got rid of, as it is in the way if left on deck. The entire operation is too slow, and this is one reason for the great amount of "ready" ammunition now carried by our boats. This is all very well under the conditions of operation for the present war, but it would not do where destroyer actions were in order. We would require some "ready" ammunition, but the bulk would

have to be left in the magazines, and a power hoist to get it up would be advisable. With a 5-inch gun it would seem that such a hoist would be essential. It will be noted that there are available hatches for use in case of failure of the hoists.

The present United States destroyers carry twice as many torpedo tubes as they can use at one time, and these are very badly disposed as regards operations in heavy weather.

The present United States vessels do not provide protection for the personnel going forward or aft along the decks in very bad weather or at high speed. There have been cases where the personnel aft have remained aft for days (U. S. S. *Ammen*) without getting forward. Neither do they provide the best arrangements for voice tubing, steering leads, and electrical leads from forward aft. As a rule, these tubes and leads pass aft through the fire and engine rooms or on deck, and in some cases through trunks in oil tanks in such positions as to be inaccessible for examination or repairs. In the proposed design all such piping and leads would go aft through the wing passages, as also would the personnel in bad weather.

The war has demonstrated that the United States boats have inadequate facilities for officers' quarters. There was an excess complement carried for training, and it can be assumed that this will be necessary again if a war breaks out, and provisions should therefore be made. Also, the boats have all the officers in one part of the ship. The danger of this was shown in the case of the *Chauncey*. In the proposed design there are actual stateroom arrangements for 12 officers, which probably would, on a vessel of this character and cruising radius, include also a paymaster and a doctor. Battle stations would require at least 10 officers. But there are transoms in the bridge emergency cabin, the chart house, and in the wardroom, which would "sleep" four or five more if necessary. Also, the officers are quartered both forward and aft; they are above the weather decks; they can reach the bridge with full protection from the weather; and in the forward group of staterooms there are two which are large enough to serve as forward mess rooms at sea.

The present overhaul facilities are very poor. The lathe is located generally in the engine room, and there is little else. There is no protected space for the overhaul of torpedoes. The carpenter's mate must do his work on the weather decks. In the proposed design a very large workshop is provided, in which there is also a stowage for extra torpedoes. The number that can be stowed here is far in excess of the three torpedoes shown in the plan. This space measures 30 feet athwartships and 26 feet fore-and-aft, from which there is taken a space measuring 17 feet by 10 feet for 2 cells and 2 electric motor installations, one for ammunition hoist and one for the after-ventilating set.

In the "flush-deck" type the fireroom blowers are so located as to "rob" the galley. This is due to the overhead restrictions in the entrance to the galley. The proposed design will not have this drawback.

In case of having to close the engine-room hatch the present boats will find operating conditions below to be rather bad, in spite of forced ventilating arrangements, because the vents necessarily are small. In the proposed design the after half of the after funnel is an exhaust from the engine room of great size. It would contain an exhaust blower. In addition, there are two supply blowers, with intakes in the walls of the after deck house, which deliver fresh air to the after corners of the engine room.

ADDITIONAL FEATURES OF THE PROPOSED DESIGN.

The proposed design has no outboard fittings of any nature which would in any way suffer damage in docking. The only boat davits which rig out are the forward ones of the Welin type, which are well clear of the side.

As regards the oil tanks in the firerooms outboard, these are incorporated into British vessels, the idea being to use the oil in them first, then to fill them with sea water as a protection for the boilers. In a vessel of the type of DESTROYER defined in the early part of this article, the presence of such tanks could not be at all objectionable.

There are water tanks outboard of the magazines. These are for fresh water and, in addition, form excellent protection.

The depth-charge projectors are of the single-barrel type, and are carried on a platform *below the main deck* in such a manner that their muzzles are just clear of the deck. This facilitates loading them from "tilt bins" located in the line of the main depth-charge tracks.

There are two power steering stations provided, the second one being on top of the small after ship control bridge on top of the after deck house. The steering engine is in the engine room of the ship, with a shaft leading aft, as indicated in the plans. The hand steering gear is in the steering-gear room over the rudder post. The communicating gear from the fore bridge to the steering engine would, of course, be carried in the wing passages.

The boat is especially well provided for stowage of food. Fresh provisions are carried on deck just abaft the galley, and bread is carried in a large box projecting from the galley forward into the blower trunk. This location will insure keeping the bread cool and clean. The two large storerooms forward should contain sufficient room for dry stores for a trip of 30 days or more.

For officers there are ample toilet facilities. Experience has demonstrated that they will be well worth while. For the crew,

the head may be reached from the lee hatch from the wing passages, while the wash room and the laundry are both below decks. The chief petty officers have a combined head and shower similar to that fitted in the wardroom country on the 750-ton destroyers.

The gun director is located in a house of its own. It is assumed that the full Vickers system of broadside director firing will be installed. The director, therefore, carries with it a revolving hood for the protection of the operators and of the sights from the wind and, as far as possible, from the spray. The room in which the director is located is large enough to facilitate the installation of a desk for tracking, if considered advisable. The Ford range keeper would be carried on the director, as in the installation on the U. S. S. *Caldwell.*

On top of the deck house on the bridge is a 3-meter range finder *with pedestal mount*, and with a spray shield for the operator and his trainer. This is in the most direct communication with the director station.

The spotter could take station on the forward searchlight station or in the foretop.

There is no aftermast. Such a mast, if knocked down, would tend to foul the propellers. Also, in the arrangements of features of the proposed vessel it seriously interferes with other more important items.

There has been criticism of the location of the two sailing launches, but experience of over five years on destroyers has indicated that boats located so far aft as this, and so high—13 feet clear of the water—would be as well protected as anywhere. There is no other location practicable without interfering with other more important considerations, so the location of the boats is considered secondary.

The utilization of the dummy half of the after funnel as a housing for a boat-crane mast has several advantages. As the boat crane tends aft and as the funnel has a rake aft, there is introduced a stabilizing effect in the rig of the boom. The location of this strongly supported mast within the funnel stabilizes the latter, so that not only will guys be unnecessary, but the funnel will be available as a support for the backstays of the ship's mast.

Three boilers allow the needed saving in fore-and-aft length for additional oil tanks. The boilers are very large. The pumps would be located along the athwartships bulkheads.

Attention is invited to the radio compass and the auxiliary radio room, and to the after set of torpedo directors, all of which are on the top of the after ship control station. Attention is also requested to the handrails on the sides of the forebridge abaft the housed-in part, as this space is so large as to prove dangerous in a seaway without them.

While the discussion in this paper is primarily of the DESTROYER type, it is thought advisable to state briefly the essential features of the TORPEDO-BOAT type.

Length, 280 feet.
Beam, 28 feet extreme; 22 feet on deck at torpedo tubes.
Draft, 8 feet.
Displacement, 800–900 tons.
Horsepower, 25,000.
Speed, 40 knots.
Fuel, 250 tons.
Guns, two 4-inch, one between funnels and one on small deck house aft.
Tubes, four 21-inch on center line; two between after funnel and after gun deck house, other two aft.
Depth charges, 20, on deck tracks.
Freeboard, forward, 20 feet; waist, 10 feet; aft, 7 feet.
Form of bow, turtle back (angle 45°) for 60 feet, then bridge deck house.

GERMAN TORPEDO BOATS AND SUBMARINES.

Source: Official Report of an Austrian Commission of Inspection.
September 1917.

Tonnage.

The commission was shown a chronological record of torpedo construction in Germany. Under Tirpitz, the first torpedo inspector, tonnage of the torpedo boats under construction rose from 120 tons to 640 tons. After Tirpitz the tonnage sank again to 550 tons, shortly, however, to rise above 600 to 900, and now is mounting over the 1,000 mark, even to 2,200.

Types.

Out of the experience of war three types have been developed, which the German Navy is now building:

(*a*) A type of about 1,100 tons (48 boats under construction), which is intended to accompany the fleet and for daylight attacks.

(*b*) A type of about 2,200 tons, with a great fuel-oil-carrying capacity, on the 1st of June 1918. These are intended to undertake actions on the enemy coast.

(*c*) It has been shown to be necessary to build a small type of little draft, which is to be used in searching for mines. The first type of these boats, *A 1*, are of 130 tons, *A 2*, of 270 tons, *A 3*, of 420 tons.

A boat of the *A 2* type is in Pola.

A boat of the *A 3* type is coming to Pola by railroad. They have two engines and only two torpedo tubes. A boat of the first type, *S. M. 131*, was inspected by the commission.

Experiments in Boat Construction.

The general lengthwise lines which were embodied in the present torpedo models are the result of experience in the war, and may be described under the two following heads:

(*a*) It has been found necessary to raise the low freeboard 40 centimeters in the 1,100-ton type, 60 centimeters in the 2,200-ton types.

(*b*) The space between the forward-deck bridge, which with us was used for torpedo tubes and for air line to the forward boilers, is left out, because in a heavy sea tubes may not be fired and the boiler intake was under water. Now in the torpedo boats the forward deck is joined to the bridge. The forward torpedo tubes are placed aft of it; the boilers suck air from a ventilator aft. The lengthening of the fore deck to the bridge has the result that the gun placed there (2,200-ton type) is further aft and more protected. In addition the men's quarters are improved.

Lessons Learned in Tonnage and Armament.

Two experiences have been learned in relation of armament to tonnage:

(*a*) The 8.8-centimeter gun proved itself to be much too small.

(*b*) The seaworthiness of torpedo boats under 800 tons proved to be bad if any gunnery results were to be obtained.

A gun on the forward deck may be considered useful by day merely as opportunity presents; at night the flare is so blinding that it can not be used. The 1,100-ton boats have no guns forward. The 2,200-ton boats, on the other hand, are equipped with a 15-centimeter gun.

It follows that in Germany boats under 800 tons are being withdrawn from the fleet and devoted to less important uses as the new boats come in the service.

The 1,100-ton Torpedo Boat.

The 1,100-ton torpedo boat has three 10.5-centimeter guns installed amidships, aft of the bridge. There are provided two fire controls, one above the flying bridge, one on the after bridge. Each is equipped with a 3-meter range finder and also with a modern directional indicator which is electrically connected with the guns. At each a 95-centimeter searchlight is placed.

The torpedo equipment consists of six 50-centimeter torpedoes, of which two lie in single tubes, starboard and port, abaft the bridge. The other four torpedoes are in the two double midship tubes. The

firing of the torpedoes is accomplished electrically from the bridge, or may also be done from the deck by hand.

The torpedo tubes are similar to ours (Austrian). Sighting and firing seems to be rather a complicated matter, since the two tubes are not laid parallel one with the other. Against submarines 16 carbonite bombs are carried; four are placed in the racks ready to be dropped clear of the ship. The after mast is short and strong and equipped with a boom for lifting and lowering aeroplanes.

Communication System.

Everything has been done to develop an excellent system of communications, the need of which on torpedo boats has first been appreciated during the war. Speaking tubes of a diameter of 11 centimeters connect the navigating bridge with the after bridge and with the after receiving station for orders. The receiving stations near the forward bridge are connected by speaking tubes of about 9 centimeters in diameter.

In addition to the mechanical engine-room telegraph an electrical engine-room telegraph has become necessary. This carried only the directions "forward—" "stop—" and "back."

A network like telephone system is installed and provided with headpieces in which the main stations are at the navigating bridge, at the after bridge and fire controls, at the forward fire control, at the three torpedo tubes, and at the three guns, and at the depth charge racks.

Every conversation is registered by all telephones and may be answered by all of them. One benefit of this telephone system is in the freedom of motion and unoccupied hands.

The 2,200-ton Torpedo Boat.

The armament of the 2,200-ton torpedo boat consists of four 15-centimeter L–50 guns amidships and two midship double torpedo tubes for 60-centimeter L–8 torpedoes (range 5,000 yards at 35 knots).

Submarines.

The torpedo equipment of several submarines was visited. They have two to four torpedo tubes forward, one or two tubes aft. Exterior angular station (from 15 degrees to 15 degrees) is provided in all submarines.

Exterior depth regulations are provided on all the newer submarines wherever the position of the tube in the bulkhead makes this possible.

The new submarine cruisers are also armed with four 15-centimeter L–50 guns.

CONSTRUCTION AND REPAIR.

GERMAN BATTLESHIPS *BADEN* AND *OLDENBURG* AND LIGHT CRUISERS—NOTES ON CONSTRUCTIONAL FEATURES.

Source: Capt. Stuart Farrar Smith, Construction Corps, U. S. N.

30 December 1918.

In general it was impossible to make any detailed observations during the inspection from which these notes were gathered. The points noted were set down without any attempt to indicate what is new and what is uninteresting. The three most striking features were:

(*a*) The large amount of wood in the magazines.

(*b*) The fact that the turrets have no interior structural framing.

(*c*) Crew's quarters badly cut up and accommodations apparently very poor.

BATTLESHIP *BADEN*.

Battery 8-38 centimeter guns in four turrets, all on center line. Secondary battery guns are on main deck and out at ship side. Casemate armor appears to be about 5.5 inches thick at ends of casemates. Each secondary battery gun is inclosed by splinter bulkheads of apparently about 60-pound plating. There are two 15-centimeter anti-aircraft guns on the port side of the upper deck, none on the starboard side, and nothing to show that any have been removed.

Linoleum is used on all covered decks and on all bridges; the edges are secured with metal strips. Other weather decks are planked, apparently about in accordance with United States naval practice. Linoleum is used in the magazines and handling rooms.

Channel sections are apparently used throughout for frames, beams, and bulkhead stiffeners.

The principal athwartship bulkheads in machinery space have no doors below the waterline. There are three shafts, each with two turbines; the forward and after turbine on each shaft are in separate compartments, but the bulkheads between these compartments each contain a hinged and hand-operated door; in fact, in one of the wing compartments it was noticed that the door had been altogether removed. In addition to these doors there were fixed glass lights in the athwartship bulkheads between the two turbines on each shaft. There were no doors through the fore and aft bulkheads separating the engine rooms, but, instead, fixed glass lights were fitted. In the firerooms, however, the fore and aft bulkheads were fitted with doors, giving access entirely across the ship. There were two coal-burning

and one oil-burning firerooms, the boiler rooms being athwartship, with furnaces facing each other. No power-operated bulkhead doors were seen, and it is believed none are fitted. Nothing in the nature of a sound-proof booth was observed in the engine rooms.

The bridges were fitted with glass screens on the forward side and the rail was covered with heavy wire netting and canvas up to a height of about 4 feet, replacing our splinter mattresses. There was no screening to the after side of the bridges and no artificial heat.

The conning tower was built around the fire-control tower, the latter being high enough to permit looking over the top of the conning tower; access to the latter from the bridge was through a door which was about the size of a large manhole. There was a larger door leading from the bridge deck directly into the fire-control tower, with a door from the latter into the conning tower.

One long base range finder was installed under the armor in each turret. One smaller range finder was installed on the forward fire control tower, and there were navigating range finders on the navigating bridge. There was also a range finder on the admiral's bridge. There was a second fire-control tower forward of No. 3 turret. The foremast is of tripod type.

The top of main armor belt appears to be about 6 feet above water at present loading. The main armor belt appears to be carried to the extreme stern. (All main and secondary battery ammunition removed.)

Firing mechanism had been removed from the turret guns, and breech blocks from those of the secondary battery.

The turret plating of the turret armor is so disposed as to be self-supporting and there was no internal turret framing except some small brackets connecting the side to the turret floor. The butts of the armor plates appear to be connected by internal butt straps, partially let into rabbets in the plates; these straps were secured to the armor by large dowels screwed in with a plug wrench. The head of the dowel having a square socket, there were, consequently, no armor bolt heads to cover and no need of anything in the nature of mantelet plates. The casemate armor, however, was secured with bolts and nuts, but the latter had no caps or mantelet plates, and there was nothing in the nature of side sheathing in the secondary battery casemates.

Secondary battery ammunition is supplied by endless chain hoists, the charge and shell being sent up horizontally. Much wood is used in the magazines, and no insulating sheathing could be observed, except that in some cases heavy pine boards were fitted, either over the steel bulkheads or else as temporary bulkheads. It was not possible to determine whether these boards were sheathing or actually served as bulkheads. There was artificial supply ventilation in the maga-

zines, but the ducts appeared to be small. Sprinklers were fitted throughout, the sprinkling pipes being very much larger than is usual on our ships. Each magazine also contained one small refrigerating pipe under the deck overhead, but it is not known what system of refrigerating is used. The magazine floods were fitted in the floor and served also as drains; they were of the ordinary floor drain type of valve. It was noted that doors were fitted between the turret handling rooms and the turret magazines. There was also a passing scuttle in the bulkhead, with a heavy cover for pressure, but nothing in the nature of a squirrel cage or self-closing flap was fitted to the passing scuttle.

Nothing in the nature of paravane gear was observed.

Those boats which were stowed on the bridge deck were handled by booms, which stepped on independent derrick masts; there were two of these booms. Some of the boats were carried on the upper deck and were handled by a girder, somewhat like the rotating part of an ordinary hammer head crane; the step of this girder was at the edge of the boat deck, the axis of rotation being vertical.

The steering gear is of the right and left-hand crew type, with a steam steering engine aft.

The crew's quarters appear to be very much cut up and with little berthing space; in fact, when actually at sea a large part of the crew are said to have had to sleep on the decks, and that this was one of the important causes of the trouble with the crews. The mess tables and benches are of a type similar to those used in the United States Navy, but are clumsier. The tables are made of steel, with linoleum let into the top.

BATTLESHIP *OLDENBURG*.

Main battery 12–11-inch guns in six turrets, two being on the center line and four arranged outboard, as in the case of the 8-inch turrets of our pre-dreadnaughts.

Casemate armor, conning tower, fire-control tower, in general similar to *Baden*. Long base range finders under armor in turrets have periscope ends, striking up through turret roof. There is an auxiliary ship-control station (compass, steering wheel, etc.) at the range-finder position on center girder in No. 1 turret.

Shell hoists come straight up between the axes of the guns and to the rear of them; the powder starts from the handling room in hoists, which are built immediately against the outboard of the shell hoists. Halfway up these hoists terminate on a rotating platform forming part of the turret, and the charges are here transferred to the upper hoists, which come up in the turret proper, just outboard of each gun and abaft the shell hoist. The transfer from lower to upper hoist is made by sliding the charges lengthwise.

There appear to be interlocking flame-proof flaps at the transfer point, but this could not be examined in detail. It was observed that there were sheet-metal flaps over the hole in the lower part of the hoists, where the powder is loaded from the handling room. The turrets are electrically operated.

Breechblocks and sight telescopes removed from turrets, but spare parts, tools, etc., still on board. The shell are stowed in steel-plate bins on the deck below the powder. The chain hoists for shell handling were observed to be very compact and requiring little headroom. Part of the shell was stored on the same level with the powder. The above-described arrangement of hoists requires considerable width and makes a very roomy turret. The turret rear plate appeared to be about 10 inches and had a hole about 15 inches in diameter cut at about opposite the breech of the gun. This was closed only with a light plate cover for watertightness and is apparently used for disposing of the brass cases of the powder charges. The deck coverings were as in the *Baden*, except in the crew's quarters, where the deck was bare, with roughened steel strips running fore and aft. Remarks as to magazine arrangements and fittings and crew's quarters apply as for *Baden*.

LIGHT CRUISERS AND SMALL CRAFT.

Linoleum is used on the bridges and sheltered after part of forecastles. Wood gratings were used on the bridges of some destroyers. Some upper decks were bare with roughened steel strips running both fore and aft and athwartships. Screening of bridges was generally limited to a screen in front of the central portion only; no rear screening noticed, the wings of bridges unprotected.

Crew's quarters are very cramped and much cut up. Deck in these spaces generally bare with nonslipping strips. Fittings in magazines for refrigeration, ventilation, sprinkling, etc., same as on *Baden*, and same large quantity of wood observed.

On the *Koenigsberg*, one of the latest of the light cruisers, it was noticed that the inclined armor deck came very close over the machinery, and that wiring, piping, and other fixtures were secured directly to the underside of the armor deck. The thickness of the latter could not be observed.

The light cruisers have a conning tower forward, its thickness being about 2½ inches. Boats are handled by turning davits of built-up section. All anchor windlasses have vertical spindles. Forced ventilation is used inside the superstructures.

On all but the latest destroyers the deck plating is fitted with seam straps of roughened steel, probably double. There are also roughened strips transversely between the seam straps, otherwise the

weather decks are bare. On the latest destroyers the plate edges are joggled.

Vessels fitted for mine laying and mine sweeping were, in general, provided with a boom hinged under the forefoot hoisting and lowering in the center line of the vessel, so that when down it sticks out under the water in front of her. From the forward end of this boom when lowered a cable leads aft on each side and tows a water kite, apparently for the purpose of protection against mines, along the same general lines as paravanes.

ORDNANCE.

VARIOUS NOTES ON GERMAN SUBMARINES AND TORPEDOES.

Source: Official Report of an Austrian Commission of Inspection in Germany. September 1917.

(11222 j.)

MISCELLANEOUS NOTES.

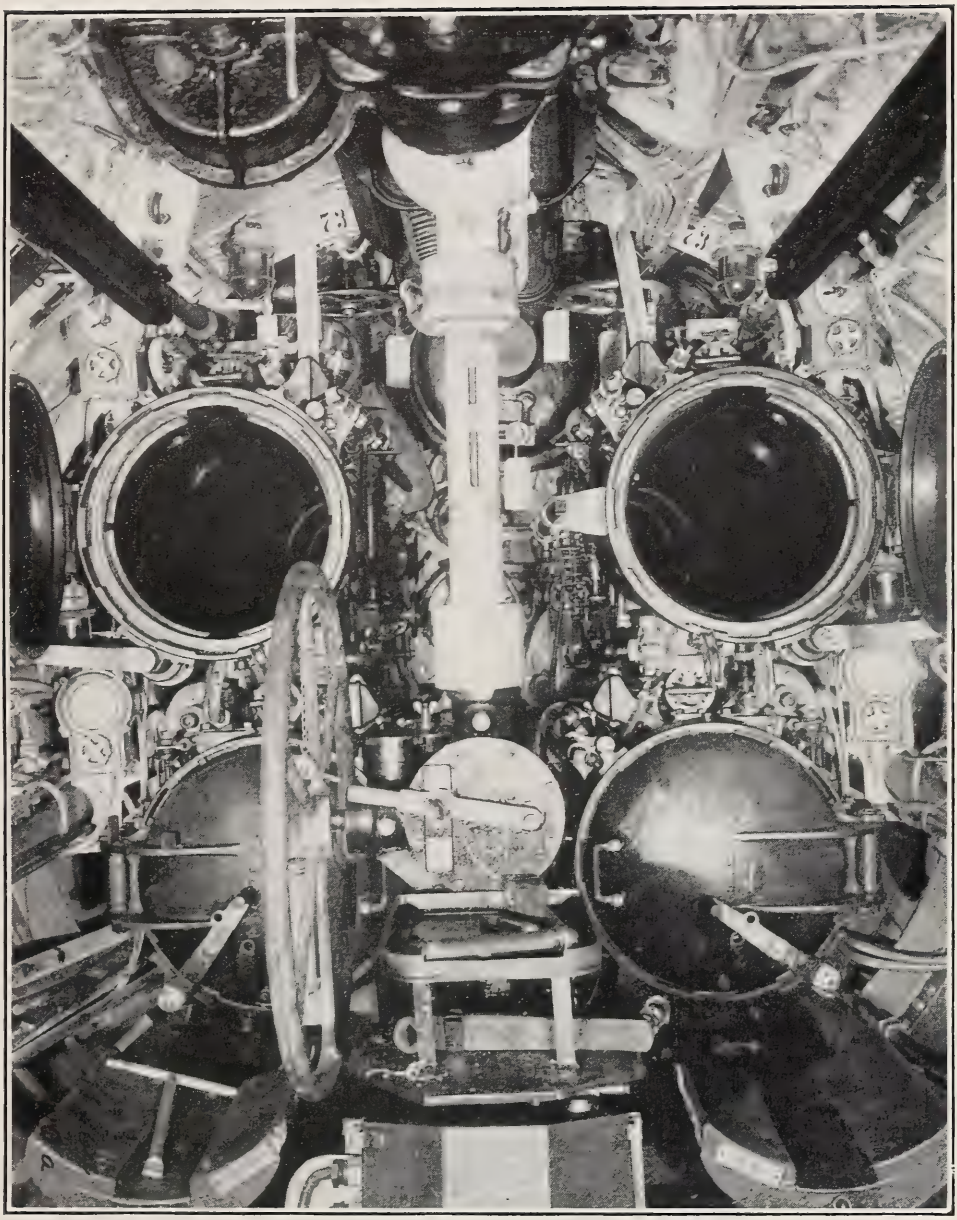
Battle cruiser *Hindenberg*, 32,000 tons displacement, 100,000 horsepower, 26.8 knots maximum speed, which in deep water can be increased to 28 knots. Armament 30.5-centimeter guns.

Since the Treffer in the torpedo air chamber and the detonator has up to the present been found safe, *the torpedo tubes* (for 60-centimeter torpedoes) on the small cruisers *are again placed on deck.* Guns of the nine ships of the *Deutschland* class, which are out of commission, are being sent to Flanders. They are being dismantled and the metal melted.

All artillery and torpedo target practices which took place in peace times are being continued in war time. Practice consists of 120 runs for battleships, 100 runs for cruisers, and 80 runs for small cruisers and torpedo boats yearly.

For the poor results of the submarine warfare in July, 1917, reason is given in the radical change of steamer routes accompanying the change in the signal code beginning July 1, and the circumstance of a greater than usual number of submarines under repair—30 in all. In July 351 torpedoes were fired; *five submarines did not return home.*

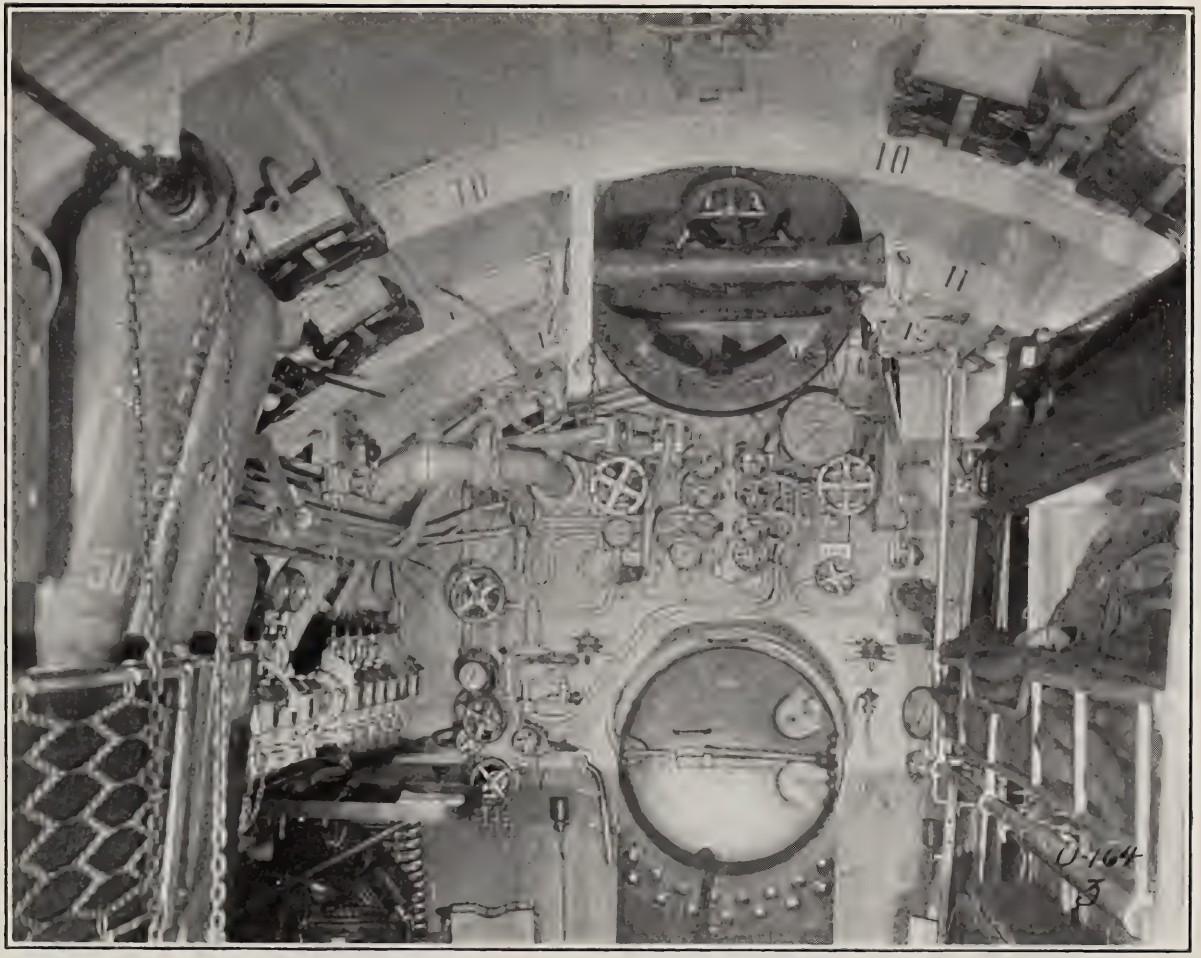
The two ex-cargo submarines under the command of Captain of Corvett *Kophamel* were at sea for about 3½ months. Displacement 2,000 tons, radius 22,000 miles, armament two 15-centimeter 50-caliber and two 8.8-centimeter guns, three torpedo tubes. Fifteen hundred rounds for the 15-centimeter and 18 50-centimeter



50

GERMAN SUBMARINE U-164.

Looking forward. Forward torpedo compartment, showing a close view of the torpedo tubes.



GERMAN SUBMARINE U-164.

Looking forward and to port in after torpedo room.

torpedoes each per tube. Crew 40 men, in addition to 30 men for the prize crews intended for two captured vessels. After having fired 900 rounds of 15-centimeter ammunition, 80 tons of ballast had to be taken aboard in order to make the boat divable again.

In Flanders an enemy submarine mine net of a length of 35 kilometers was brought in. One boat alone brought in a length of 12 kilometers. Several other boats were injured by the net. The use of torpedo boats in Flanders is very great.

The defense of Kiel against air attacks consists of 200 balloons between kites which in the evening ascend on cables of piano wire on which the aeroplanes are intended to come to grief. Up to the present a German flyer has fallen through their agency. The anti-aircraft defense has spared no pains, even though no enemy flyer has yet sought Kiel. A great aerial attack is expected since Kiel and Friedrichsort (4 kilometers from Kiel) is the main torpedo station.

The need of officers is ever becoming greater and despite the placing out of commission of ships of the *Deutschland* class has not been relieved. From individual ships of the fleet there have been as many as seven officers recently transferred to U-boats, which were replaced by officers out of merchant marine. The loss of officers during the war is over 800.

The German torpedo authorities are not neglecting progress made in foreign countries, but instead observe them closely. For instance, the Imperial Navy until now has ordered yearly an air compressor from the Whitehead Co., even though it possesses an excellent model itself. For the study of this compressor a committee was called in Fiume under the guidance largely of the director of the Friedrichsort torpedo factory himself, studied there in all deliberation the newest types, and made use of anything that was learned. Many of the mechanical parts of German torpedoes are modeled after those of the Whitehead Co., but with German patience and thoroughness far improved upon and perfected.

The report goes on to show how Austria has not made the most of her opportunities, stating, for example, that the German Navy, which at the beginning of the war first began to draw upon the Whitehead torpedo, has now in its possession more data and experience concerning that type than Austria herself. At the testing ground at Fiume the Austrians could not but wonder at the attitude of the German commission in contrast to their self-satisfaction. At Fiume the torpedo was merely examined, but in Germany for the first time was thoroughly tested and improved upon.

The Germans possess testing apparatus of which the Whitehead Co., with its primitive equipment, has no idea.

The various Austrian torpedo factories stand in no kind of relationship to each other, but meet only through the Navy itself, where the products of each organization are gathered together.

In continuing the subject of Austrian preparedness, the report mentions the fact that the Austrian testing grounds are of 4,000-meter length, while torpedoes have a 10,000-meter radius, and from such example and from generalities comes to the following conclusion:

One can not but foresee that the firm of Whitehead & Co. will, after the war, lose its worldwide position of torpedo factory, a future of which its directors are already taking account, for after the experiences of the present time the navies of the great powers will, at least, build their torpedoes in their own country, and the custom of smaller states will not be able to avert this fate for the Whitehead Co., if, indeed, they will not draw their torpedo material from our present enemies for political reasons.

England has possessed for a long time a branch of the Whitehead Co. in Weymouth; in France another such was built in 1912 at St. Tropez, near Marseilles; the Italians before the beginning of the war established a branch in Naples. Japan has already ordered great numbers of single torpedo parts on the pretext to develop from them a better type. There remains for us no other course than to establish under Government control a central torpedo factory with its proper appended departments.

GERMAN TORPEDOES.

The German torpedoes are markedly more solidly and massively constructed, therefore heavier, and withstand more than 1,000 trial runs. Single ones have been fired over 3,000 times. This is partly obtained by a mechanism to reduce wear on the working parts. This consists of a zinc plug which is attached to the air line in such a fashion that it is melted at a temperature of 200°, whereupon the lead from the fuel burner is cut off and the torpedo continues cold on its run.

Recently the torpedoes were so crippled that all the necessities, air, fuel, water, and oil supply leads, could be regulated for either a distance or a short run.

THE TORPEDO FACTORY AT FRIEDERICHSORT.

General.

This torpedo factory was engaged in the construction of torpedoes and tubes.

It was under the command of Capt. von Hering; the technical department included Chief Engineer Giessen. The working staff included 4,000 men, mostly civilians, and 400 women. The technical and administrative personnel was about 1,000.

Capacity.

The factory has reached its present size only during the war, so that it is now able to deliver 350 torpedoes *monthly*, as against 25 before the war and 35 submarine torpedo tubes. The torpedo factory naturally includes the greatest part of the workshops, and, as far as a rapid inspection revealed, it is generally similar to those of the Whitehead Co.

Special Equipment.

All drawings are completed in the construction offices, whose individual departments are under the control of the torpedo engineer. The draftsmen are civilians.

The appraisal and testing of the quality of material is conducted with the greatest care. The material-testing stations are equipped with all the most modern machines and apparatus for testing of materials and for metallurgical investigation.

With most extraordinary care is every part which goes into the gyroscopes examined. For instance, not only are the Lagerkugeln exactly calibrated but tested and sorted by and according to a spring apparatus for their elasticity.

The axle points and the corresponding bearings for the axles of the Cardan rings are hardened under the oversight of a torpedo engineer, and are tested for their form and functioning in an expansion and projection apparatus for their elasticity, hardness, and endurance by blow, fall, and shattering tests.

Equally is the examination of all other material careful and systematic.

The manufacturing of torpedoes is done in series, which naturally assists the rapidity of their construction, although it has this disadvantage; that the workmen become overspecialized, and already there prevails a shortage of able workmen for general torpedo repair. The torpedoes in Friedrichsort are built from the ground up as far as tre reservoirs, which are made by the Krupp works in Essen, or more recently also by the Ternitzer works, or else are put together from the single parts manufactured by private industries.

The air reservoirs are no longer soldered, but instead are smooth finished and are tested with heavy mineral oil for their ability to withstand water pressure. The tops of the reservoirs, in accordance with the experience learned from the Whitehead Co., are bound by a binding of 0.2 millimeter thickness, whereas previously the tops were fitted exact but when cold.

The chamber adjoining the reservoir as well as the ballast chamber are leaded (15 per cent S. N. plus 85 per cent P. B.). The casings for the ballast chamber and for the detonators are made by private

industries and are hammered into the desired shape at the workshops.

Portions which are cast are poured at the factory. The material seems to be of prime quality. The individual castings are somewhat more massive than in the Whitehead.

Testing of the Torpedoes.

The completed machines, as well as the heaters, oil siphons, etc., are put to a brake test through a hydraulic brake. The temperature in the engines and of the waste steam is taken.

After the torpedo has been put together the endurance of the engine is tested in an endurance apparatus. This consists of a sinkable raft in which the torpedo is fastened and then lowered about 2 meters under water. The life, pressure, and engine temperature is thus measured. For this test the torpedoes received were special and somewhat smaller torpedoes.

Factory and Personnel.

The increase in the capacity of the torpedo factory has naturally necessitated many new buildings, which are constructed according to most recent ideas—high, light, with central heating, and generally equipped with parquet floors. Important departments are protected by iron roofing and nets against aerial bombs.

For the personnel there are provided subterranean bomb proofs. All means are taken to secure the welfare of the workmen.

The majority of the workmen eat at the works and pay 0.80 marks a meal. The kitchen and dining rooms are roomy, light, and painfully clean, and the individual rations ample. The hourly wage averages about 1.60 marks, the daily earning wage reaching 30 marks in a nine-hour working day. Thereby the Imperial Torpedo Workshops are able to secure skillful workmen and to enter into competition with private industries.

Overtime does not exist.

Joint Capacity of Various Factories.

The torpedo factory, with 350 torpedoes monthly, is followed by the Schwarzkopf Co., with 150, and then by the Adler Co. with 100 torpedoes monthly. The test runs for this total of 600 torpedoes monthly are only to be accomplished through five ranges of the torpedo factory and by about 50 ships, as well as a large testing personnel.

THE DOUBLE GYROSCOPE.

General.

This is composed of two revolving masses, side by side and suspended in Cardan rings, which (the revolving masses) operate alter-

nately during the run of the torpedo. The apparatus operates as long as there is a sufficient supply of air. This in comparison to the single gyroscope, which is dependable only for a short time, is a marked step in advance.

Description.

The two rings are operated by a common shaft from the steering engine. The shaft is vertical and carries a fork, which is attached through a link of the central gears. This link may be thrown out of gear at will, so that an angular shot may be undertaken. The central gear cogs with two others which operate the vertical rings of the revolving masses. These gears are attached to the vertical rings by a coupling. At the beginning of the run one of the revolving masses attains a speed of 9,000 revolutions through air pressure; the other a speed of about 5,000 revolutions a minute. To this end the revolving masses are equipped with shovels, upon which the compressed air operates through narrowing nozzles and places the revolving masses in motion. The mass which is turning out 9,000 revolutions is coupled to the shaft and takes care of the horizontal swing of the torpedo: the other revolving mass is out of gear. The air from the steering engine serves to set in motion this second mass, which little by little increases to 9,000 revolutions. At the same time the steering engine actuates a meter. After about 45 seconds this meter throws the first mass out of and the second mass into gear. The change of gear is accomplished very quickly (in about one-hundredth of a second). In this fashion both revolving masses operate alternately during the entire run of the torpedo. For torpedoes of great range and long run this arrangement is of particular importance.

Equally with an apparatus of this kind one attains far greater precision on a long shot than with a single gyroscope, with which last a very considerable sidewise motion can not be overcome.

AIRSHIPS FOR FIRING TORPEDOES.

Purpose.

In the torpedo school the commission was shown an airship which had been built for the purpose of firing torpedoes, laying mines and also for dropping bombs.

Description.

The aeroplane was a double-winged model with a speed of 21 meters and with two 180-horsepower motors. The torpedo launching gear is placed under the gondola, in a carrier specially attached for this purpose. To secure the torpedo there are provided two fixed semicircular rings, within which the torpedo is placed. This is done through a kind of frame. The torpedo is first placed on this frame, then raised and let into the launching gear. To support the torpedo

are provided two iron straps which equally with the torpedo are raised by the frame and are made fast to the semicircular rings. They are secured by the horizontal pegs at each end of the iron straps, which engage four hooks that in turn are operated by the worm gear. The hooks are joined to the semicircular rings and each opposite bar pivoted upon a common axle. These axles are bound by a lengthwise rod, on one end of which is a worm thread and which in its forward or backward motion either engages or releases the carrier hooks. As the thread is released it spins free, withdrawing the support from the pegs of the metal straps, whereupon the torpedo is freed and falls from the framework.

In order that the iron straps might not be lost on each occasion, they were lashed by a long, thin line, on which the straps remain hanging after the torpedo is thrown.

This launching tackle is the same as was constructed and tested in the Austrian Navy for torpedo motor boats. The only difference is that in the German arrangement the launching is accomplished by a screw thread, in the Austrian Navy directly by hand.

The launching of torpedoes from aircraft has not yet become reliable. The torpedo at the beginning of its run travels upon its upper surface, thereby often diverting its original direction. The above arrangements have also been adapted to the laying of mines. The mine which is to be laid and its anchor comprise together a cylinder of 45 centimeters diameter and about 2 meters in length.

UNDERWATER BROADSIDE TORPEDO TUBE.

General.

The underwater broadside torpedo-tube apparatus on the battle cruiser *Hindenburg* was visited. In a single torpedo room are built in two tubes at an angle of 70° from the bows. The tubes are side loaders, and each one weighs 30 tons. The apparatus consists of a stationary built-in tube, of which the one horizontal half may be opened and closed. Furthermore, there pertains to the apparatus a movable vane, a massive directional piece, perforated in order to lessen its resistance to water, and profilewise is semicircular.

Description on Functions.

The procedure on firing is as follows: First, one of the four torpedoes, which are carried above the tube, is placed in the apparatus. This is done by first winding down the torpedo to the same elevation as the tube. At the same time the hinged half of the tube opens and is placed horizontally. The torpedo is then pushed into the tube and the tube is closed. All those motions are done by hydraulic power.

Now the directional vane is shoved out, the slide opened, and the torpedo fired. The hydraulic equipment makes it possible that the loading and firing take place in a short space of time. Indeed, with the new tubes a torpedo may be fired every 24 seconds.

After the torpedo is fired the slide closes automatically, so that scarcely any water penetrates into the tube, and so that the tube may be opened immediately.

It is to be mentioned that the directional vane was originally a rod, which, however, did not prove satisfactory at the higher speeds and was replaced by this directional vane. The reason was that the torpedo in passing out over the rod met too great a water pressure on leaving the tube and did not readily free itself from the rod. With the directional vane it is hoped to obtain better results. The tests are not yet entirely ended. It is said that for speeds up to 21 knots the new apparatus has proven successful.

Conclusions.

A comparison of our Whitehead or Armstrong torpedo tubes with the German apparatus immediately establishes the distinction that the latter is a quick-slide loader. This not only results in saving of space in the torpedo room but, because of the greater rapidity of firing, has also the result that only one tube needs attention during the period of time involved. The circumstances, however, that the directional vane must be pushed out before firing and, in that position, must be dragged by the ship certainly raises an objection to the apparatus.

EXPERIMENTS AND DISCOVERIES.

Organization.

An experimental committee consisting of a captain, several officers, and torpedo engineers was appointed for torpedo research work.

Present Undertakings.

The study of the speed explosive boat; experiments with the new underwater broadside torpedo tubes of the S. M. S. *Hindenburg* and with torpedo aeroplanes.

The torpedo laboratory is engaged in experiments with explosives in which are working graduates of the technical high schools and universities.

Registering Heads.

In trial torpedo runs so-called "registering heads" were used. These mere casings of a torpedo head are equipped with in-built indicators for turning and diving. Such heads that in addition are used in the research with broadside underwater torpedo tubes are also equipped with an arc, which serves to register greater deviations. It is shown that the torpedo on firing from the broadside underwater

tube is apt to suffer great deviation (up to 180°). Such deviations are not to be measured by the ordinary pendulum deviation indicator.

The torpedo heads which have been weighted to war standard lose their charge of weighting material at a specified point in the run, whereby the head becomes lighter and the torpedo comes to the surface so that a diver is not needed to search for it.

The German Navy obtains these "registering heads" from the Maihak Co., of Hamburg. The request addressed to this firm if they will be able to supply the Austrian Navy with such "registering heads" was answered in the negative, with the reason given that the firm at that time was so busy filling orders for the German Navy that it was not in a position to undertake orders for other customers.

Research into Ship Damages.

Damages occurring to ships through enemy torpedoes, mines, or gunfire are examined by the laboratory and photographed. The experience learned thereby is used in the building of new types.

Experiments in Explosives.

The laboratory has also conducted a series of experiments in order to study the effect of an explosion upon the hull of a ship. As a subject there was taken a square of sheet iron (1.5 by 1.5 meters) which on the reverse was an imitation of the hull of a vessel, double or even triple bottom, all transverse supports, and even filled with coal.

In this case the explosion was of a kilogram of explosive in a form similar to a torpedo head. The target was protected against pressure at the back and from the sides by a strong metal overcoat in order to make the experiment nearly as possible similar to reality. It was learned that a triple bottom presents a good protection against explosion, although the experiments conducted are not relatively correct in view of the small explosive charge used.

Measurement of Pressure from Explosion.

The measurement of pressure by explosion is conducted by the laboratory through the known cylinder method. Cylinders of the same material are variously placed in the water in relation to the explosion center. From the deformation of the cylinders conclusions may be drawn as to the degree of pressure. A second method consists in substituting for the cylinders homogenous copper plates. Each plate is inclosed in a thick casing and only one side is exposed to pressure.

Explosives.

The laboratory also possesses an exhibit of explosives which have been taken from enemy torpedoes and mines. The English use for explosive a kind of ammonal (85 per cent ammonperchlorat, 10 per cent paraffin, 5 per cent aluminum). The Russians use T. N. T. or

trinito benzol with picric acid; the French use guncotton of a density from 1.4 to 1.45, which absorbs up to 35 per cent of water.

Net-Destroying Apparatus.

For torpedoes which are to be fired through nets a special explosive arrangement is used. This consists of a small cartridge of about 200 grams of tetryl, which is equipped with a percussion cap. This cartridge is fastened to the torpedo head by four thin arms about 50 centimeters long. Through contact of the cartridge with the net the tetryl is exploded, tearing a hole through which the torpedo passes. In this fashion the torpedo head is not prematurely exploded. Should such a torpedo be fired against a ship unprovided with torpedo nets the thin carrier arms are broken off, whereby the explosive charge of the torpedo is not hindered from coming into contact with the ship and exploding as usual. Against two nets two such arrangements are used placed at different distances from the torpedo head.

A new experimental torpedo is being built at Friederichsort of 70 centimeters for the loader *L–9*, which is to be equipped with two 4-cylinder engines placed upon its lengthwise axis.

Turbine Torpedoes.

For several years experiments have been made with turbine drive for torpedoes. These, however, have been laid aside because of the war. The turbine is a more massive and precise piece of construction than those which are delivered to us by the firm of Melms & Pfenninger.

Electric Torpedoes.

A torpedo driven by storage batteries is being tested. To the present, however, their experiment has attained no satisfactory results. In the first place, the range as also the speed was very small; secondly the batteries suffered from being too quickly discharged. The experiments, however, are being continued with great persistence, since the electrical torpedo leaves no wake in its course.

GERMAN BATTLE CRUISER *HINDENBURG*—FIRE CONTROL.

Source: Official Report of an Austrian Commission of Inspection.

(NOTE.—Translation as received is not entirely clear.)

September 1917.

(11222 J.)

Equipment.

In order to obtain the necessary fire control there is a special torpedo top on the forward mast, which is equipped with a 3-meter

range finder, which ascertains the distance and course of the enemy in intervals of two minutes. A torpedo officer stationed at the central is provided with a patent log (operated by an outboard propeller and a "Tochterrose"), which gives for any moment the position of the ship in relation to a specific point of departure.

On a plotting table, which is spread with squared paper, the relative position of the ships engaged is represented on a scale of 1 in 50,000 (2 millimeters–100 meters) as soon as observations in the torpedo tube are begun. After four to six representations (of the own and enemy position), the speed and course of the enemy in relation to the own course is established. These results are transmitted to the first torpedo officer in the conning tower, who there determines the necessary angle and fires the torpedo as soon as the object passes through the sights.

A check, whether the range will be sufficient (1,500 yards at 28 knots, or 5,000 yards at 35 knots), is determined by the third torpedo officer in the torpedo central on his plotting sheet and also by the first torpedo officer in the conning tower by a projection.

On each side of the forward conning tower is placed a pelorus in an embrasure, which indicates in the torpedo room the desired angular setting. A lamp indicates when the order is carried out. On each side is a bearing periscope apparatus, "Goerz," with adjustable opening.

In the conning tower aft two ordinary pelori are placed in embrasures. Angular settings, however, can not be undertaken from this station.

In a gun casemate, both starboard and port aft, are placed further pelori. The one is for the forward and starboard torpedo tube, the other for the after and port.

Communications.

The communication system consists of:

(*a*) Far-reaching speaking tube.

(*b*) Telephone.

(*c*) Optical transmission through lamps which light at the various stations of command. Firing is electrical.

Night Shooting.

At night firing is impossible from the conning tower, since the torpedo officer is blinded by the light in the conning tower. (The *Moltke* was obliged to neglect several opportunities to fire during the Skagerrak battle.) The torpedo officer, for night firing, has on both sides and outside of the conning tower an aeroplane pelorus, and from these is in telephone communication with the torpedo room.

GERMAN TARGET RANGES.

Source: Official Report of an Austrian Commission of Inspection.

September 1917.

(11222 J.)

For the many trial runs there have been established five ranges at different points of the North Sea. Three of them are for 15,000-meter runs.

The committee visited the "strande" range, near Friederichsort, which is one of the three largest. The manipulating station is roomy. Electric winches bring the torpedoes to their tubes. All torpedoes are fired from overwater tubes. One of these tubes, however, is exactly similar to that constructed by the Whitehead Co., and may be lowered for underwater firing. No firing is done from frames, as this is dissimilar to reality. The range was dredged to a depth of 16 meters. Even this is considered too shallow.

The height of the observation tower is 20 meters, where telescopes (40 X) are installed. The targets are placed at 500, 1,000, 3,000, 5,000, 10,000, and 15,000 meters. Only the first is of wood; all others of iron, from 2 to 3.5 meters broad, 20 to 70 meters long. These pontoon targets are divided into water-tight compartments, since nonintentional accidents sometimes occur to the targets. The targets are held in place by four anchors with buoys.

By day 12 distant shots, or 60 short shots, can be undertaken. Six recovery boats belong to such a station.

At each range is a repair and drying-out workshop.

Cleaning of Tubes.

The cleaning of the tubes after a powder shot is accomplished by a stream of water, which is not only more economical than our soap-and-oil procedure, but also more surely flushes any foreign matter remaining.

GERMAN TORPEDO SCHOOLS.

Source: Official Report of an Austrian Commission of Inspection.

September 1917.

(11222 J.)

Officers' Course.

The torpedo school in Flemsburg is composed of a course of from 8 to 13 weeks and specialized for battleships, torpedo boats, submarines, and aeroplanes. Torpedo instruction is in all four courses the same, the officers being specialized in their assigned branches.

Battleship torpedo officers are specially trained in tactics, for which a special and large schoolroom is provided with a table divided into squares and representing a battle field.

Torpedo-boat officers are specially trained in navigation.

Submarine officers, for whom the course is only eight weeks, are specialized in U-boats.

Torpedo aviation officers receive their special training at the school, which is equipped with two large aviation fields.

Course for Enlisted Men.

(*a*) Torpedo machinist's course. This includes various torpedo equipment of large ships and small. Particular attention is given to the preparation of torpedoes for firing.

(*b*) Torpedo mate. These are trained for the special service of torpedo tubes and also in the preparation of torpedoes for firing under the direction of the torpedo machinist.

Drills.

For practical work the S. M. S. *Wurttemberg* and six boats are provided which, at the end of the theoretical courses, put to sea from Monday until Friday.

The *Wurttemberg* has nine deck torpedo tubes. In 1916, 6,800 trial runs were made.

The extent of the instruction may be appreciated in that the torpedo school at times is provided with six to eight steamers on which daylight attacks are made by the school boats; then again these steamers will be convoyed by the school boats, attacked by a squadron of torpedo aeroplanes, and protected by the school boats.

The Torpedo Division at Kiel.

Its purpose is the training of crews for torpedo boats.

These crews are divided into deck, torpedo, gun, engine, firemen, signal, and radio branches.

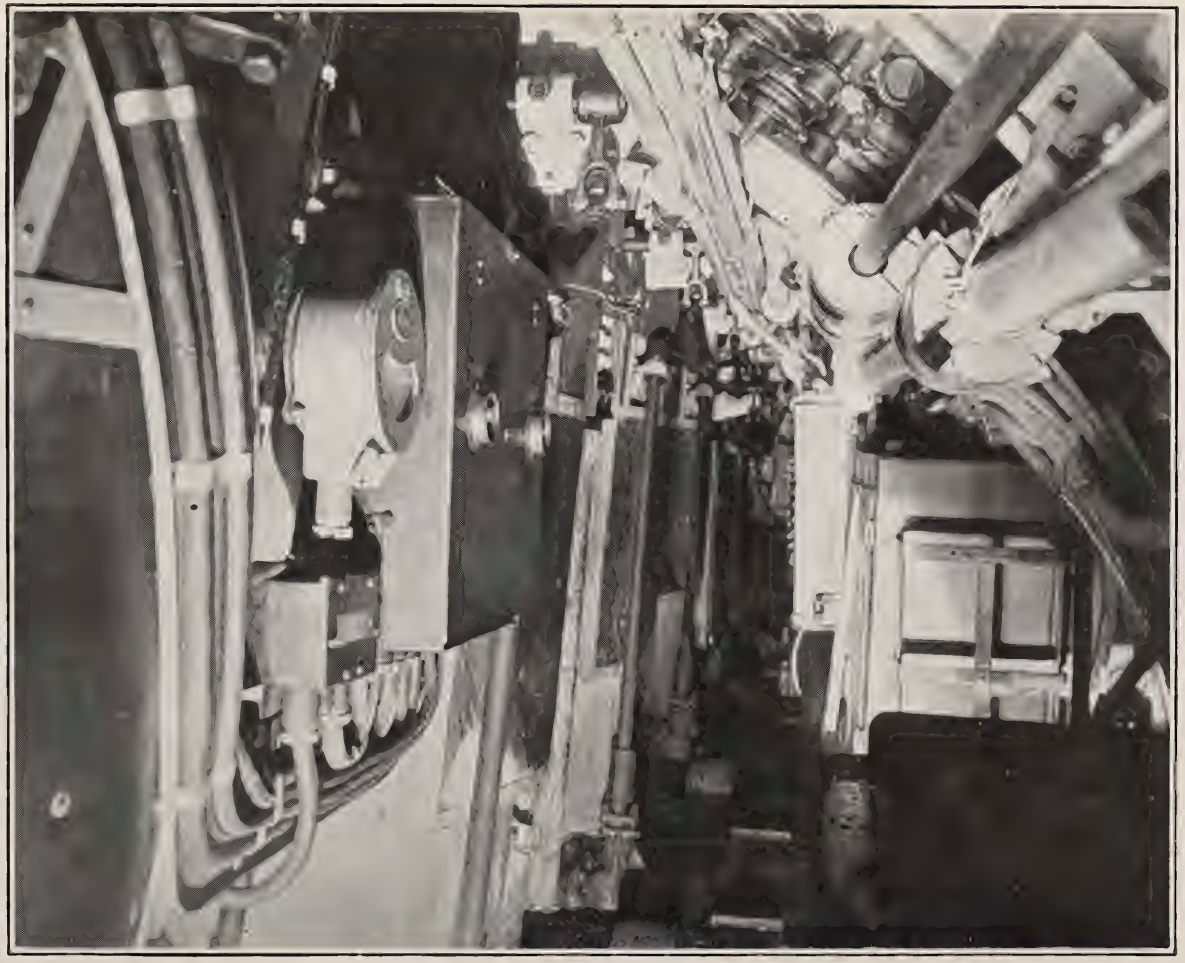
For its maintenance there are provided well-equipped schoolrooms, and in addition seven modern boats on which, however, only the group leaders are trained. On these boats, theoretical training is given.

During the war 40,000 men have been trained at the torpedo division in Kiel. The torpedo division has a repair workshop employing from three to four hundred men, which makes all repairs to boats that have suffered damages, which could not find place in the overfilled dockyards. The organization is such that work may be begun either day or night on any torpedo boat that arrives in a damaged condition. Practically all repairs are uninterruptedly conducted until completed.

Torpedo Engineers Corps.

Composition.

The torpedo engineer officers' corps consists of 40 engineers.



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GERMAN SUBMARINE U C 105.

Forward compartment containing vertical mine-laying tubes.

Training.

The curriculum for torpedo engineer cadets comprises a lower school or some other voluntary one-year course, then two years' practice in machinery construction, and a finishing course of five semesters in some higher construction school.

After enlistment the cadet serves a three months' military period. Then follows a nine months' course on a torpedo school ship in order to learn ship's routine and everything concerning torpedoes and torpedo tubes.

After examination follows the advancement to torpedo engineer applicant. The applicant is attached for six months to the torpedo workshop and then again returned to the torpedo school ship for six months in order to thoroughly learn the firing and handling of torpedoes.

After another examination follows the advancement to torpedo engineer chief applicant, in which rank six months more are spent in the torpedo workshop at actual construction work, and then six months at the torpedo research school to become familiar with new developments.

After still another examination the student becomes torpedo engineer aspirant, in which he spends a year in charge of a small workshop and construction bureau. Thereafter follows the appointment to torpedo engineer chief aspirant, in which position he spends from 6 to 12 months in an engineer's school, and after another examination receives the rank of engineer lieutenant. (He is now from 26 to 28 years old.)

GERMAN MINES.

Source: Official Report of an Austrian Commission of Inspection.

September 1917.

(11222 J.)

The German mine is in principle similar to our (Austrian) carbonite mine, of which the German Navy ordered 60. The anchoring hence consists in the functions of a hydrostatic plate which is attached to the mine case. On being laid, the mine sinks to the bottom with its anchor. After several minutes the connection between the mine and anchor (salmiak) is freed, the mine rises until the hydrostatic valve operates the catch, by means of which the mine now rides stationary on its cable. The firing mechanism consists of four knobs; each knob contains a vial of chromic acid. The glass vial is inclosed in a rubber coat. If a knob is broken, the glass is broken with it, whereupon the acid closes an electrical connection and the mine is fired.

In these mines the detonator is only brought in contact with the firing charge when the mine is laid, only then making the apparatus

explosive. Otherwise, the detonator remains separated from the firing charge, making the firing of the mine impossible.

The same type of mine is used for laying by submarines, only that the connection between mine and anchor is not "salmiak," but a "cataract" valve (with glycerin).

The commission was shown an apparatus for mine sweeping. The sweeping is done, as with us, with two boats which drag a sweep line. When a mine is found a small firing charge is brought against the mine cable and exploded, whereupon the mines come to the surface.

The procedure is very slow and uncertain. The German Navy is, therefore, searching for a better system. Recently the same principle which we have tested is being developed; that is, the cutting of mine cables through a combination of shears and small powder charges. This the commission was not shown.

OPERATIONS.

AUSTRIAN BATTLESHIP *RADETZKY*, TAKEN OVER BY UNITED STATES NAVY.

Source: Lieut. Commander E. E. Spafford, U. S. N. R. F., commanding U. S. S. *Radetzky*.

19 November 1918.

On 17 November a United States subchaser flotilla entered the harbor of Spalato with orders to take over the Austrian battleship *Radetzky*, and proceeded into Bai-Castelli, where were anchored the battleships *Zrinyi* and *Radetzky*, formerly of the Austrian Navy, flying the American flag at the fore and the flag of the Jugo-Slavs at the gaff. Fregattenkapitän Milan Ritter von Millinkovic, commander of the *Radetzky*, came on board the U. S. S. S. C. *248*, on which the United States authorities were quartered, and arrangements were made for handing over the *Radetzky* to them. A casual inspection of the *Radetzky* was made on that afternoon, which revealed that a great deal of the equipment had been removed.

On 18 November at 2 p. m. (central European time) the *Radetzky* was taken over and placed entirely under the United States control. The ship was left in charge of Ensign Thomas M. Conroy, U. S. N. R. F., it having been necessary for the commanding officer to go ashore to confer with the local authorities.

The following commendation of Ensign Conroy is quoted from the report of the commanding officer:

Ensign Conroy exercised perfect judgment and initiative, and it is more than probable that he saved the auxiliaries and perhaps the whole ship by going into the fireroom, which had been deserted by the Jugo-Slav crew. The moment

that the commanding officer left the ship the fireroom force threw down their shovels, and everybody left the dynamo rooms, the firerooms and engine rooms, declining to do any further work. Ensign Conroy speeded up the pumps and went ahead into the evaporator room, where he found the evaporator without water and full of steam. Such conduct is deserving of the highest praise.

It is believed that the *Radetzky* is pretty well stripped of all portable material. Only a small portion of the crew were remaining when the ship was taken over by the United States Navy. At Pola the German-Austrian officers and enlisted men had left the ship and it is probable that they took a large quantity of the stores with them. The wireless apparatus had been partially injured by the personnel, but has been repaired.

REPORT MADE TO RUSSIAN SOVIET REPUBLIC BY CHIEF OF NAVAL STAFF.

Source: Reliable. **11 January 1919.**

(11199.)

[This report gives the point of view of a flag officer of the Soviet republic as to the naval situation in the Baltic.]

Our position in regard to the Baltic Sea, considering the latest events, can be summed up as follows:

In the Baltic Sea and gulfs the navigation continues as follows: In the open sea and to the south of the Finnish Gulf (to the south of a line drawn between Helsingfors and Reval) the navigation never closes: The harbor of Helsingfors freezes generally in the beginning of January, Reval a little later, though navigation can be maintained by the use of ice breakers. The eastern part of the Finnish Gulf freezes in December; Cronstadt in the beginning of November, and shipping in this part of the gulf can only be kept up by the use of powerful ice breakers and tremendous efforts.

In view of the above, if naval operations are contemplated during the winter in the Finnish Gulf, a base would be necessary in the western part of the gulf or in the Baltic Sea; in any case, not east of Reval. Cronstadt could not be utilized as a base at this time of the year.

In the Baltic Sea and the Finnish Gulf possible and likely enemies are:

1. The allies, principally England.
2. Sweden.
3. Finland.

The possibility of the allied fleet appearing in the Baltic depends principally on the support that Germany may agree to furnish and her consent to defend the mine fields which she laid during the war.

According to the amnesty agreement between the allies and Germany, the latter is compelled to remove all the mines laid, and yet the blockade of Germany is to continue.

Should the German Government consider it necessary to fulfill these terms she can not of course defend these mine fields, and the allies can immediately commence to remove same and enter the Baltic within a few weeks.

Besides the gulf, there is a way into the Baltic through the Kiel Canal, and if the Germans find it impossible to retain full control of the canal, the allies can use this canal to enter the Baltic. It remains for the Germans to decide whether they should interfere with the passage of allied ships or not.

The naval strength of the allies is unlimited, and the number of ships they may send to the Baltic will depend on the objects they wish to attain and the importance of same, considering that these operations would entail the risk of losing some ships from striking mines and from our submarines.

The next possible enemy of ours in the Baltic is Sweden, who has one battleship of 6,800 tons, with four 11-inch guns; 12 old warships, and a few others, including 15 torpedo boats (weak in comparison with our new ones) and 9 submarines. With regard to the condition of the above, no information has been received for the last year. The possibility of Sweden attacking us is not reckoned with at the naval general staff, as they are unable to judge of the possibility; but as they have no assurance that Sweden will remain neutral they should consider this question from a strategic point of view. Although it may be impossible for Sweden to wage war with us, it is still possible that her shores may be utilized by the allies as bases for their submarines. Finland does not possess a fleet at the present moment, but only a few armed steamers and mine layers, but if she will be against us in the Baltic, whether with the allies or Sweden, the Finnish shores, with their natural fortifications and ports for ships, could serve as very favorable bases for operations against the southern ports of the Finnish Gulf and Cronstadt. The mines laid by us before and during the European war still remain, with the exception of those removed by the Germans and Finns after the Brest agreement, as they were never renewed and never looked after, and they can not be looked upon seriously, the more so as mine fields should be defended by ships.

The only mine fields which have been looked after by us and controlled are those lately laid before Cronstadt. If these mine fields were continued to the southern shore and renewed in these parts entering Finnish waters, these defenses, being under fire of our ships in Cronstadt, could hold up the enemy for some time should they attempt to enter this harbor. There would be no object in laying mines farther west, as the Finnish waters are considerably wider and we have not the means at our disposal of defending them.

Referring to the ships which we have at our disposal at the present in the Baltic, it is necessary to take the following facts into consideration before putting much value in them:

1. Material condition.
2. Condition of the crew and staff.
3. Supplies, principally firewood and coal.

Regarding the first question, the majority of the ships of any value are in a comparatively good condition as far as artillery, mines, and mechanism are concerned, but after four years' war and one and one-half years of revolution they need repair. Those in the best condition are:

Two battleships of the *Respublika* class, one cruiser of the *Oleg* type, eight torpedo boats of the *Novik* type, and eight large new submarines.

Regarding the crew, there are not sufficient men to man all the ships but sufficient for those above mentioned. The crew are inexperienced and not acquainted with the ships they are serving on. Ships with such crews require time for training and trial shooting, which is a difficult proposition considering that such a short time remains before navigation closes. In view of the foregoing it is necessary to limit the number of ships ready for operations to one battleship, one cruiser of the *Oleg* type, four torpedo boats, and eight large submarines.

Regarding coal available in Cronstadt, Petrograd, and under shipment, there is only four and a half to five million puds. (Note.—A pud is equal to 36 English pounds, therefore the maximum estimate is 90,000 tons.) Coal reserve very small. Under the present circumstances, the ships could not carry on operations long as they would very soon run short of coal, especially as during operations where would be a demand for coal for mine layers, floating repair shops, bases for submarines, etc. Our fleet therefore is not in a position to undertake operations taking any length of time.

According to the commanding staff of the fleet, the monthly consumption of coal and oil during operations amounts to 10,000 tons of coal and 3,000 tons of oil.

Returning to the question of the operations that the Baltic fleet may be intrusted with and taking the above conditions into account, there are two alternatives, depending on whether the German Government will render support or whether we shall be left to ourselves.

First alternative.

With Germany's support:

1. Germany to take on herself the hindrance to the allied fleet entering the Baltic.
2. Germany agrees to assist us should Sweden attack us.

3. Germany delivers to Reval a sufficient quantity of coal and other material as will be required.

4. A plan is arranged for joint action on the sea.

Should such an arrangement be made with Germany, our winter base could be transferred to Reval (though not for the *Novik* type and submarines, as Reval is not suitable for dreadnaughts) wherefrom our ships could undertake winter operations against the ports and shores of the Baltic Provinces, and, if necessary, against Finland, depending on the political and military situation. In the agreement with Germany it could be included that she put a few ships at our disposal to strengthen our fleet.

Second alternative.

Without Germany's support, we must bear in mind that the appearance of the allied fleet in the Baltic and Finnish Gulf is very probable, and Reval may be occupied from the sea at any moment. In this case we should have to use Kronstadt only as a base, having only about three to four weeks left before navigation closes. The ships of the allies can be expected on the Baltic in a few weeks and their submarines earlier, and our ships must reckon with the risk of being attacked by them.

The conditions of things would then be the following:

The Baltic Sea would be open, but we would have no support and small quantity of coal, and so all our ships can do within the three to four weeks before navigation closes is to—

1. Have some moral effect on the Baltic province ports by threatening to bombard.
2. Ship literature and certain people.
3. Ship a small number of troops without horses and ammunition.
4. Support our land forces from the sea.

It must be borne in mind, however, that in this case the allied fleet might put in an appearance and our ships would have to take to cover in Kronstadt, where they would be shut in by the ice and enemy.

(Signed) Chief of the Naval Staff,
Ev. Berens.

RUSSIAN BALTIC FLEET.

Source: Military Intelligence Division.

24 January 1919.

(10911 B.)

Commander Miasnoff, of the cruiser *Rossiya*, stationed at Kronstadt, states that the fleet is in a worse condition than ever. The

crews, consisting of Letts and Esthonians, are very dissatisfied with the régime; more, perhaps, than with the economic conditions. The commander does not believe these men to be of any fighting value, and states that as far as Kronstadt is concerned a few shots from a British cruiser would produce the white flag of surrender. A few torpedo boats and three cruisers have arrived at Kronstadt for urgent repairs.

VISIT OF SWEDISH FLEET TO COPENHAGEN.

Source: Reliable.

4 February 1919.

(11280.)

The Danish Admiralty has been informed by the Swedish Admiralty that a Swedish fleet will pay a visit to Copenhagen in connection with its maneuvers in the sound, arriving on 13 February. The fleet will consist of four armored cruisers and half a torpedo-boat flotilla, under command of Vice Admiral Ehrensvard.

It is the first time for many years that a Swedish fleet of any size has visited Copenhagen.

The visit is believed to be intended to be a Swedish demonstration of the fact that the party principally interested in Baltic affairs, and especially Baltic maritime matters, is Sweden. It is especially meant to emphasize this at a time when British and French men-of-war are taking so active, and to Sweden offensive, a part in Baltic waters.

The Danish Admiralty feel rather uncomfortable about the visit and about its taking place just at this time, when the allies have declared a blockade in the Baltic. The Danish Navy will naturally do its utmost to receive the visitors with every show of hospitality.

ITALIAN PRIZE MONEY.

Source: Reliable.

22 January 1919.

(9270 P.)

The Royal Italian High Naval Council has determined to award the sum of 650,000 lire to Capt. Luigi Rizzo and the sum of 81,250 lire to each of the men composing the crew of Rizzo's torpedo boat, M. A. S. *15*.

These awards are for the sinking of the Austrian dreadnought *Szent-Istvan*.

COMMUNICATIONS.

NOTES ON RADIO INSTALLATION ON GERMAN BATTLESHIPS AND SUBMARINES.

Source: Lieut. Commander W. J. Ruble, U. S. N.

26 December 1918.

BATTLESHIPS.

Data obtained from S. M. S. *Thuringen*, *Posen*, *Hanover*, *Elsass*, and *Schlesien*.

Radio rooms.—The radio rooms on all the above ships are located amidships and below the protective deck. The rooms are about 15 by 15 feet, and the arrangement, type, and amount of apparatus was identically the same on all battleships. There is only one radio room on each ship, and all apparatus was in this room, which was not soundproof.

The apparatus consisted of the following:

1 arc transmitter with switchboard.
1 spark transmitter with switchboard.
2 small-sized receivers.
2 two-step amplifiers.
1 large instrument, which looked like a receiver, and was said to be a large receiver, but which might have been a direction-finder receiver. It is not certain whether there was an amplifier for this instrument.

Arc transmitter.—The arc transmitter was very compact, and was said by the German officers to be very efficient. The Germans claim that we (the British and United States) had no similar apparatus.

The arc chamber had no door or opening into the chamber, and no means of removing the poles were seen. There were four pipes and two conductors entering the chamber.

The loading coils were pancake type, mounted in a glass jar filled with oil.

No wave-changing switch was noticed.

Inductance was mounted on the segments of a circle on two sides of the arc chamber. The bottom ends of these segments rested on an inclosed base.

Receivers.—All receivers were of a standard design and were mounted on a long table, which extended across the after end of the radio room.

All receivers had crystal detectors, with two-pin base. These detectors could be removed for examination but were plugged in sockets when in use.

Amplifiers.—The two stage amplifiers were mounted on the bulkhead beside the receiver. This amplifier was very small, about 2½

inches deep, 8 inches wide and 10 inches high. The bulbs were mounted on each side. In the center between the bulbs were two pilot lamps or fuses.

No meters were attached to the amplifiers.

Two stages of amplification were used, with a crystal detector.

Antennæ.—Only two antennæ were carried; one, two, or three wire flat-top antenna suspended between the tops of the masts and one flat vertical antenna in two sections. Each section suspended between the ends of two yardarms on each mast.

It is considered that this is a good method of obtaining two antennae with a maximum capacity in each.

SUBMARINES.

One hundred and twenty-three submarines were surrendered at Harwich, and United States inspecting officers have made a complete report of the radio apparatus and radio masts.

The radio rooms were much larger than any designed for the American *S* or *AA* class submarines. They were sound proof, but not electrically shielded.

The radio masts, which were operated from inside the boat, folded down on deck when not in use. They were made of steel, were about 40 feet high, and were provided with a perch for a lookout and steps to mount the mast.

One mast was carried on their smaller submarines and two on the larger cruisers.

This mast is better than any now in use by, or contemplated for, United States submarines.

There was no evidence of any direction finders, radiotelephones, or valve transmitters, on any class of ships.

Direction finders are in use on shore stations and give excellent results.

AVIATION.

EXPERIMENTS IN COMMUNICATION—NAVAL AIR STATION, KEY WEST, FLA.

Source: Weekly Report 78, Naval Aviation.

10 February 1919.

Seaplanes and dirigibles at Key West have been taking part in the maneuvers of surface and subsurface craft now being conducted at the base with Aldis lamp, radio, and radio telephone signals.

The Aldis lamp signals were successfully sent from about 1½ miles radius; radio from seaplane from an 8-mile radius, and due to bad hearing in the receiving set, combined with interference, made acknowledgement of the message very difficult. Buzzer and spark communication was successfully carried out and readable at all times during the maneuvers through the engine and wind noises with motor wide open.

EXPERIMENTS IN PHOTOGRAPHING FROM AIRCRAFT.

Source: Weekly Report 79, Naval Aviation.

17 February 1919.

Recent tests of a new attachment for mounting "F. & S." aero cameras have shown very good results. This attachment allows the camera to be pointed in any direction, supports it against the pressure of the wind, and enables the photographer to have both hands free for removing and placing plates without detaching the camera. Vibration seems to be completely absorbed by means of supporting the mounting on a short length of rubber hose of large diameter and stuffed with horse hair. Photographs taken under the most trying conditions—that is, at low altitudes and with the slowest shutter openings—show no effects of vibration.

FUELLING DIRIGIBLES AT SEA—EXPERIMENT CARRIED OUT BY NAVAL AIR STATION, CAPE MAY, N. J.

Source: Weekly Report 80, Naval Aviation.

24 February 1919.

On 7 February an experimental flight with dirigible *C–3* was made from Cape May, N. J., for the purpose of taking on fuel from an S. C. boat while in flight. Fuel tanks were picked up in the following manner:

After the S. C. boat was headed directly into the wind the dirigible headed in the same direction and flew directly over the boat, maintaining nearly as possible the same speed. A line rove through a single block, which had been secured to the port suspension, was then lowered to the deck of the boat, and a gasoline tank hooked onto it. The boat then went to starboard and the dirigible to port, while the tank was hoisted up without difficulty. This operation was several times repeated, and proved the practicability of refuelling a dirigible from boats at sea.

ENGINEERING.

SURRENDERED GERMAN SUBMARINES—ENGINEERING.

Source: Lieut. Commander H. T. Smith, U. S. N.
Lieut. Commander Holbrook Gibson, U. S. N.

31 December 1918.

(11222 D.)

ENGINE WORKMANSHIP.

The workmanship on the engines is uniformly excellent. The material itself is uniformly fine in structure and shows the utmost skill in manufacture. All working parts are machine finished and accurately fitted. The engines are apparently designed in every detail to produce a finished product, each detail contributing to the final result. No makeshift jobs or evidences of afterthoughts were visible, as is often the case in less scientific machines.

Practically all nuts on the engine are wrench tight on their bolts or studs the full length of the thread and all are secured by means of pins, wires, or locking washers. Hand wheels on high-pressure air lines are large and fitted with a quarter to a half turn of lost motion on their stems, to give a slight striking force for opening or closing. Pipe flanges which require frequent disassembly are made up with portable fastenings. The flanges are slotted in place of drilled bolt holes and the bolts are hinged under the lower flange.

Air bottles are of steel, two spray flasks and two starting bottles being supplied for two 1,200 horsepower engines. The combined capacity of the starting bottles is about 35 cubic feet.

Due to rigid construction and fine balance, the engines operate with extremely little vibration and are comparatively quiet. The engine room air is free of smoke and gases and the exhaust is perfectly clear and well muffled.

The largest engine installation observed was on the *U–135*. This vessel is one of the latest German submarine cruiser type. Lack of opportunity prevented a detailed inspection, but, in general, the installation is as follows:

The main engine installation consists of two M. A. N. air-starting, four-cycle engines, 1,750 horsepower each, at 380 revolutions per minute. The main engines are not used for charging. Friction clutches are installed between engine and motors. The main engine working cylinders are 530 mm. in diameter and the stroke of the engine is 530 mm. The engines in operation are very quiet and smooth running. The pistons are oil cooled. The construction of

the piston is different from the smaller type of engines of the same design. The piston head being separate, it is thought to be made of a special steel composition. Accurate information on this point could not be obtained. Forward of the main engine room and forward of the central operating compartment is the battery charging room. The installation consists of two M. A. N. Augsburg four-cycle engines of 450 horsepower at 400 revolutions per minute. These engines are air starting. The engines are placed side by side in the usual manner with electric generators at the forward end, the operating end of the engines being aft. In addition to charging the batteries, these engines can be employed at high speed in conjunction with the main engines by means of electric drive. The vessel is thus capable of developing 2,200-shaft horsepower on each side.

SPARE PARTS.

The quantity and item of spare parts varied with various boats: Cylinder heads, pistons, main bearings, spare valves of all kinds, springs, piston rings, main bearings, crank pin bearings, etc. Provision was made for properly storing heavy spare parts behind the main engine on the plating of the hull. All parts were tagged with plan number and item number. Small spare parts were stored in special lockers made of galvanized iron provided with trays. On some of the vessels these spare-part lockers are stowed under the engine-room floor plates and in convenient places about the engine. The stowage lockers on some vessels are located inside the trunk of the boat hatches. The most noticeable feature of the stowage of spare parts was the thoroughness in properly labeling the parts and the great care used in the packing of the parts. A part when needed can be located at once and in perfect condition. Complete sets of gaskets for all parts of the engine are provided. All the gaskets are cut and finished ready for immediate use. All gaskets are properly tagged and stowed in suitable lockers provided for that purpose.

TOOLS.

Tools, both standard and special, are neatly stowed in racks with a silhouette of each tool painted on the rack to insure proper stowage. Special tools are all numbered for the purpose intended.

NOTES FROM U. S. S. "SCORPION."

CONDITIONS IN CONSTANTINOPLE DURING THE WAR—REPORT FROM U. S. S. *SCORPION.*

Source: Lieut. Commander H. S. Babbitt, U. S. N., commanding U. S. S. *Scorpion.*

25 February 1919.

(21036/1355.)

THE HAIDAR PASHA EXPLOSION, 6 SEPTEMBER 1917.

On 6 September 1917, about 5.25 p. m., two explosions, only a few seconds apart, shook the whole city of Constantinople. It was the beginning of the Haidar Pasha explosion, which killed the Mesopotamian campaign, planned for the following winter, 1917–18.

This campaign was to be the Turks' greatest effort of the war, the Germans having agreed to send the Turks a quarter of a million soldiers. Ammunition and supplies had been coming in from Germany since the middle of summer. These came on the *Balkanzug* to San Stefano and Zeitun Burnu (an ammunition plant near Constantinople), and were transported from there to Haidar Pasha in mahonas. The greatest secrecy was maintained. The German troops did not actually enter the city of Constantinople, and it was announced that they were going to Syria. Besides soldiers and ammunition, numerous skilled ammunition workers and large quantities of unworked chemicals and other materials were brought out. The damage may be summarized as follows:

(*a*) All the mahonas,[1] of which there were about 15 or 20, the mahona men and the mahonas' cargoes in Haidar Pasha basin were completely destroyed by explosion or burning.

(*b*) The big Haidar Pasha railroad station was almost wrecked or rendered useless by burning. Many railroad officials and families living in upper rooms of same were burned to death.

(*c*) Most of the surrounding buildings and half of the village near were burned.

(*d*) Three hundred or more German soldiers and a great number of the Turkish (unknown, but probably about the same) were killed and about the same number wounded.

(*e*) From 40 to 50 carloads of ammunition, chemicals, and high explosives blew up.

(*f*) A great number of shells stored in the station yard and vicinity exploded.

[1] Lighters.

The official Turkish communique in this regard stated in effect that there "had been a small explosion, and some material was damaged; but fortunately, only a very small personal loss was to be deplored."

The official start of the expedition was to be made at about 5.30 or 6 p. m. on the very day the explosion took place. Commander Babbitt was in the apartment of the Swedish military attaché, Col. Ahlgren, in Pera, on the afternoon of the explosion and had the best possible view of Haidar Pasha. When the first shocks came, an immense column of smoke, partly blackish and partly brown, rose to a great height and spread out over the Marmora. Shortly afterwards shells began to explode, falling in all directions. The same explosion of shells and occasional heavier shocks and detonations, occurred more or less uninterruptedly, until the following noon. The causes of the explosion were said to have been as follows:

There were (and still are) various explanations; one report was that it was caused by a bomb thrown at Enver Pasha (who was not present); and another, that it was caused by a bomb dropped by an entente aeroplane (three Greeks with whom the matter was discussed are ready to swear they themselves saw the aeroplane, or indeed, two, with their own eyes). There is good reason to believe, however, that it was caused by the carrying away of a whip on a mahona manned by Turks and owned by a Greek; and several Turkish officers, and one German (civilian), have since stated it was caused by the dropping of a box of explosives in one of mahonas while unloading. A few weeks after this, the *Scorpion* was put under guards; and all the prominent entente civilians or suspects in town, including the two British clergymen, Dr. Frew and Dr. Wigram, and others, were sent into the interior, where they remained until the signing of the armistice.

SUMMARY OF HISTORY OF U. S. S. *SCORPION*, 6 SEPTEMBER 1917–18 DECEMBER 1918.

On November 15 1917, a short time after the great explosion at Haidar Pasha, the second commander of the Place of Constantinople, came on board the U. S. S. *Scorpion* in the afternoon, and stated through an interpreter that he regretted very much he had received orders that the *Scorpion* should be placed under strict guard, and under specific directions, which he enumerated essentially as follows:

(*a*) Officers and crew shift into civilian dress.

(*b*) No boats or officers or crew to leave ship, except (1) one officer twice each week and (2) three men twice each week, same accompanied by interpreter, and the officers with a Turkish officer and men with Turkish guard.

(*c*) No communication to be held with persons outside of ship, except through Turkish authorities.

(*d*) An interpreter and guard would come aboard each day to attend to wants of ship and crew.

About two weeks later, 1 December, 1917, the second commander of the Place again came on board, and said he had just come for a call and to pay his compliments; but gave the commanding officer to understand that the crew would be transferred to Brusa (ancient Turkish capital in the interior of Asia Minor) soon, and that orders had already been prepared for this. (Several months later a Turkish subofficer, who was at Brusa at the time, gave the information that they had been notified there to prepare a place for the complement of the *Scorpion*, with the date of arrival.) Objection was made to this, stating grounds, and request was made to be permitted to see the Swedish minister, but the answer was that this would be impossible "until after the war." Permission was granted to write him a letter, however; but warning was given that this would have to go through the Turkish censor and would probably not reach the minister until about a month later (six weeks, as it proved). The second commander stated that he was very sorry, but he had no more option or say in the orders he received than we did; and when he left the ship he made a long address to the crew, saying they could have more freedom if they went to Brusa, and he regretted it very much.

In the meantime the protests left with the minister and cabinet member for use in such a case had apparently one or both been presented and pushed, for although guards and interpreters were sure that the *Scorpion's* complement was going to Brusa, and notification was given confidentially the day before that the crew would be embarked on a tug for there at 9 a. m., December 15; still nothing happened; and on December 19 the ship was moved to a mooring just outside the navy yard arsenal, near Admiralty Building, instead, where it remained until the Turkish armistice was signed.

On October 22, 1918, request was made that guards be removed and the ship allowed to resume its former status. This was granted and became effective the following day, October 23.

On November 9, 1918, request was made that guns and throttle valves and bonnets be returned and the ship allowed to be recommissioned, which was granted at once and effected same day; permission was also granted to move to any anchorage desired and all facilities offered for same, and the ship moved to a more favorable anchorage, near the Inner Bridge, the following morning.

On and from October 25, 1918, British prisoners began to appear in Constantinople who had been released from San Stefano and other places and told to go to the city. Some came from prisons in the city itself. As these had no money, no food, and no place whatever to stay, and were given no other directions when released than as above, they were taken on board the *Scorpion*. In the course of two or three days the number had grown to about 50, all that could be

accommodated on board for the time being, and then, together with Dr. Frew (a Scotch parson who had returned from exile in Brusa the day before) and Mr. Von Bummel (a Hollander previously in charge of the Y. M. C. A.), arrangements were made for the others who came in to lodge at the Y. M. C. A. building (next to the American Embassy) until the British armistice commissions came in, and finally, two or three weeks later, they were embarked for repatriation. Most of these were Australians (from the Dardanelles expedition); but the last two or three days some of the Kut el Amara prisoners also appeared. Between 300 and 400 of the latter were found out of 6,000 sent to the camps which evacuated into Constantinople. All these prisoners, both those in the Y. M. C. A. building as well as those on board, were given medical treatment—which was needed by the majority—on board, and once each day the ship's medical officer, Dr. Omelvena, also visited the Y. M. C. A. building to examine prisoners there who needed treatment. Col. Cummings, Maj. Johnson, and Capt. Matthews (Kut el Amara officers who had escaped from Yozgod and made their way to the very outskirts of Constantinople, but were then recaptured again just before the armistice was signed) were also released in the latter part of October and at once assumed charge of the organization and administration of the released prisoners provided for as above. Hearty thanks were tendered by all of the above-mentioned officers, before they left, for the help the *Scorpion* had been able to give them and their men, and also by Gen. Wilson, when he arrived, through his aide and nephew, Maj. Wilson.

On or about November 8 information arrived that the first armistice commission would arrive on the Turkish destroyer *Basra*, and together with the released Maj. Johnson mentioned above, they were met, and an offer of services was made as regarded the Germans and German ships present. This first armistice commission consisted of Commander Chilton (naval contact officer), Col. Murphy (military contact officer), and two assistants. It was possible to give them considerable information as to the recent movements of the German ships present, of which they had no knowledge, and, what was more important, information as to all the principal German agents and spies, and to warn them against a few disloyal and continued pro-German British and Americans here. The next commission which arrived was headed by Col. Temple, for intelligence service, and then other commissions and ships continued to arrive every few days. The first ship to arrive in the Golden Horn was the cruiser *Pyramus*, which gave the first news of anything which was going on with the American ships; and the first news received from the United States was from Mr. Hohler, the British diplomatic representative, who had recently come from Washington. Written or oral thanks have been

received for the information given from all the above, and also from Admiral Calthorpe when he arrived, and particularly from Commander Chilton and Col. Temple.

The U. S. S. *Nahma* arrived with relief officers and crew for the *Scorpion* on December 16, 1918, and on December 18, 1918, the command of the *Scorpion* was turned over to Commander Todd, United States Navy. (No coal was then obtainable in Constantinople, and arrangements were made to dock ships in the Golden Horn Navy Yard during the last week in December, and for an overhaul there.)

The U. S. S. *Scorpion* and the American Navy in general have an excellent reputation in Constantinople, and since the armistice was signed Ottoman subjects of all different races continually ask where the American sailors are (the streets are filled with those of the allies), why no American ships come, and why there is no American commissioner or representative here. Several Turkish members of the Government have stated that they would not have felt so badly when the allied fleets entered if there had been American ships too, and it is believed that they meant it.

TREATMENT OF ENTENTE PRISONERS IN TURKEY.

The treatment of the entente prisoners was in most cases callous and horrible to the supreme degree, and so bad, indeed, that the British prisoners even welcomed the arrival of Germans near their camps, who, they say, were the only ones "who gave them any civilized treatment at all." At one camp it was stated the British officers were compelled by the attending Turkish medical officer to eat all the lice found on themselves, clothing, or mats, and there are numerous other reports of other similar such revolting treatment. But the treatment of the enlisted prisoners was the most terrible. Of the 6,000 white prisoners taken at Kut el Amara, it is stated that only from three to four hundred ever left Turkey, and that half of these were those who went as orderlies to the Kut officers, and who thus received better treatment and were mostly saved. After the Kut capitulation the officers were separated from the men and were mostly taken to the prison camps designated for them in carriages. The men, in groups, already famished and many suffering from disease, were marched across the the desert toward Taurus Pass. Those who fell exhausted or sick were simply left by the wayside or generally in their tracks; but sometimes a quicker lot befell them. In one case a delayed party of officers, who came across four or five days after one of the groups, state they found several men still alive, without food or water, and suffering from dysentery, but who died before anything could be done for them. Most of the men surviving this trip were then, after a short delay, further marched across the Taurus Pass into Anatolia, and as no extra clothing had been given them, the

change to the climate in the Taurus and plateau, after that of the desert, succeeded in finishing off many of those remaining. The survivors finally arrived in camp, were insufficiently nourished and many of these died, also, from sickness, vermin, and ill nourishment before finally released.

The lot of Russian prisoners, mostly farmed out as laborers to Turkish farmers, was even worse; but these, used to hard treatment and a rougher life, did not suffer so much. But the worst treatment of all was reserved for the Serbian prisoners, who were sent to Turkey as practically slaves, though they had not been taken prisoners by the Turks at all, but by the Austrians and Germans. These were simply given no clothing whatever, insufficient food, and worked and treated as simply absolute slaves. Serbian prisoners have been seen by reliable eyewitnesses dying in the streets of Constantinople and begging in the streets for food and clothing, about two weeks after the armistice was signed, when they were finally released, after protest from released British officers.

THE FINAL GENERAL INTERNAL DISORGANIZATION IN TURKEY, IN THE AUTUMN OF 1918, AND THE ESCAPE OF PRISONERS.

Early in the autumn of 1918 the internal administration of Turkey became completely disorganized in most sections; the country became infested with brigands, who occasionally attacked many of the larger villages and even came to the city of Brusa on two or three occasions; the Turkish soldiers were deserting in droves, either to the enemy or themselves forming highway bands in the interior; and British and other prisoners began to desert from nearly every camp. Twenty-five Kut el Amara officers escaped from Yozgod alone and at the same time, and made their way clear across the interior of Anatolia, some toward Constantinople and the others to the coast of Alexandretta. Most of the former were captured at the outskirts of Constantinople, just before the conclusion of the Turkish armistice. Those making for Alexandretta arrived there a few days after the armistice was signed. Besides these, prisoners also escaped from many other camps and got out of Turkey through Black Sea and Aegean ports or into Constantinople, where they remained in hiding. Some of these went from village to village openly, saying they were German officers, and several others joined brigand and deserter bands and made their way out thus. In one instance four British officers going as Germans were discovered and recaptured; but while being returned to their camp by the gendarmes were again freed by deserters, who killed the gendarmes, and were conducted to the coast and got away in a boat. Lord Robert Paulus, serving as a captain, had the record of escaping three times, having been recaptured twice, and was in hiding in Constantinople at the time

the armistice was signed. Finally Gen. Townsend himself, at Prinkipo, decided to try to escape in an English aeroplane which came for him; and he would have succeeded, except for an accident to the motor of the aeroplane. He went out in the Marmora in a rowboat and was met by an English aeroplane, but the latter, on account of a motor defect, could not rise again, and Gen. Townsend had to bring back its crew as prisoners also, instead of himself escaping. These accounts are all from definite statements by escaped or released British officers, and in most cases they have been amply checked up.

THE RAID OF THE *GOEBEN*, *BRESLAU*, AND FOUR DESTROYERS AGAINST BRITISH FORCE AT ISLAND OF IMBROS, IN JANUARY, 1918.

On January 16 the *Goeben* left Stenia, in the Bosphorus, and went to Kozlu, on the Black Sea coast, to take coal; she was there three days and then returned to Stenia, where she arrived at 9 a. m. January 19. She remained about two hours, during which time she was cleared for action and all furniture and other wooden work put off; then the German admiral (von Reuber-Passwitsch) and his German staff came on board; and then, at 11 a. m., the *Goeben* sailed for the Sea of Marmora. She went to the small uninhabited group of islets beyond the Princes Islands. Here the *Goeben* was joined by the *Breslau* and the Turkish destroyers *Noumounei*, *Basra*, *Samsoun*, and *Mouavanett*, which had come down from the Golden Horn. The crews of the *Goeben* and the *Breslau* consisted principally of German sailors, and each had only three or four Turkish officers on board; besides regular crews as thus made up, the two ships also had on board all the remaining German officers in Turkish waters, including the German midshipman instructors at the Halki naval school and two or three army officers, and excepting only the German officers on the four above-named Turkish destroyers present, so that each had more officers than men, though carrying full crews. All these extra officers were taken to man the prizes and transports which it was expected to capture in the Aegean, and possibly also to occupy the Eastern Aegean Islands; and they carried a great number of hand bombs. The destroyers each had a German "second captain" and a few other Germans, but most of the crews were Turkish. At the islets mentioned, near Princess Islands, the *Goeben* stopped and the other ships went alongside and sent all the German officers to a conference on the flagship, which lasted one and one-half hours. No Turkish officers attended this conference and no Turkish officers or men were informed as to the destination or purpose of the enterprise; the rôle of the Turkish officers and members of the crew, it was stated, was simply to serve as assistants to the Germans. At the con-

ference each German present was carefully instructed as to his rôle in the coming enterprise, the purpose of which, it developed, was to furnish a magnificent gift to the German Kaiser upon occasion of his birthday, which would come in about a fortnight. They were informed that paths clear from mines had been learned from fishermen and aeroplanes and that it had also been learned that the larger British ships had gone to Malta. The conference closed about 2 p. m., the German officers returned to their ships, and later they all started for the Dardanelles by various routes, and at slow speeds, such as to bring them to the straits about midnight. En route the regular officers and members of the crew were equipped with life belts and gas masks and all extra officers exercised for bomb throwing. At about midnight a lunch was served, and about half an hour later the call to battle stations was sounded. The night was moonless and very dark; sea perfectly smooth. One-half hour after having passed out of the Dardanelles a mine exploded under the starboard quarter of the *Goeben*. This shook the morale of the crew considerably, it is reported, in view of the fact that they had been told clear paths were known. The four destroyers were now detached and left off entrance to straits to keep same clear for larger ships when they should return. The *Goeben* and *Breslau* continued on track and arrived off and behind Cape Kephalo Point, approaching from westerly direction at dawn. Fire was opened on the lighthouse and radio station on the end of Kephalo Point as soon as same was seen, at a distance of 6,000 yards, and it was destroyed at second shot. Fire was then directed on the British monitor *Raglan* in Kephalo Harbor. Shortly after this the *Goeben* struck another mine and the *Breslau* was directed to take lead. The *Raglan* burst into flame and sunk, after, however, having fired at least one heavy shot which struck very close to the *Goeben;* then firing was continued on small craft seen to right of the *Raglan*. At this point in the action the *Breslau* struck a mine and the ships turned right about. Then the *Breslau* struck another mine, and the *Goeben* reversed to give the *Breslau* tow. In the meantime both ships were attacked by aeroplanes, and before the *Breslau* could be given a tow both were also torpedoed by submarines—so the Germans reported; but as there were no submarines present, these were probably further mines—and the *Breslau* began to sink, stern first. The *Goeben* then went ahead full speed again and returned to Dardanelles by same route by which the two ships had come out. One of the Turkish destroyers lying off the entrance to the Dardanelles was now directed to pick up the survivors of the *Breslau*, but two British ships appearing at this time drove the Turkish destroyer back by a hit and then picked up 172 survivors from the *Breslau*. The *Goeben* regained the Dardanelles, but ran aground or was beached—she was listing to starboard very

badly—at Nagara Point, in the narrows, at about noon. Ammunition was disembarked, and the *Goeben* finally refloated again six days later, January 26 (?) at 6 p. m., by combined efforts of battleship *Torgud Reis* and other vessels and by screws. In the meantime during the six days the *Goeben* was submitted to indirect fire from outside the straits, to submarine attacks, and to no less than 217 aeroplane bomb attacks. The water in the narrows was continually covered with dead fish. On Thursday the crew were transported to Karkara and from there to Galata, in the Dardanelles, where they rejoined the *Goeben* again, after she had been refloated. The *Goeben* then returned to Constantinople at 20 knots speed, where the admiral and staff disembarked, and then the ship went to Stenia. This was on the Kaiser's birthday, and the German admiral, when he disembarked, was congratulated by the Turkish minister on the glorious enterprise he had achieved. There was great feeling among the population, however, for they knew who had been lost, and the latter had mostly become well known in Constantinople. The crew itself of the *Goeben*, officers and men, were not allowed to disembark until the next day, which further incensed the local population. This "glorious enterprise" caused the most ill feeling of any German action in Turkey.

AEROPLANE ATTACKS AGAINST CONSTANTINOPLE.

Sunday, July 7, 1918, at 9.30 a. m., enemy aeroplanes appeared coming from direction of Galata Tower and heading directly over U. S. S. *Scorpion*, then interned and under guard, just inside navy yard gate, near Turkish admiralty. Just as it was nearly over ship one also emerged from a cloud overhead, passing in another direction. At about the same time whizzing of bombs was heard, and three were seen falling toward forecastle of ship, and crew ran aft. They fell at an angle of about 45 to 50°, and passing across forecastle of *Scorpion* fell into the water about 50 feet from starboard bow, and did no damage. Many dead fish soon rose to the surface. One bomb struck very near the guard house off *Scorpion's* starboard bow, and one also fell very near the Sultan's yacht *Stamboul*, which was then anchored a little farther from *Scorpion*. As a result of a conversation with the aviator who dropped these bombs, when he was released here as a prisoner (having been forced to descend in a later raid), it was learned that he was really aiming for the *Scorpion*, thinking she was the Sultan's yacht, as she was nearest the admiralty. Firing by shore batteries lasted from 9.30 until 10.30 a. m. Just after the bombs had struck considerable shrapnel also fell near the ship and particularly near starboard quarter; but fortunately none fell on quarter deck, to which officers and men had retreated.

Following this attack, during the month of August aeroplane attacks were made against Constantinople nearly every day, sometimes several the same day, and generally at night, continuously for about a month.

Damage done.

(*a*) On occasion of one raid a bomb dropped near war ministry and killed a few men and several horses attached thereto.

(*b*) A bomb struck and sank the Turkish destroyer *Monvenet-Millet*, at Stenia, and killed about 20 men. It is stated that many of the men killed, were burned to death—being entrapped and unable to get through ports.

(*c*) One of the bombs, dropped about noon October 18, 1918, fell in a densely peopled street in Stamboul, near the bazaar, and killed about 40 people and wounded many others; this is the only time there was any great loss of life among civilians.

(*d*) It was reported, but not confirmed, that on one occasion a bomb also did considerable damage in the munition works at Zeitun Burnu, Makrikeuy, about half way between the Seven Towers and San Stefano.

Other bombs near Scorpion.

In the first attack, noted above, three bombs fell within about 50 meters of ship, as mentioned. During the attack of August 27, 1918, three more bombs dropped within about 50 meters of ship. Three attacking airmen, at least, stated that they had aimed for the *Scorpion*, thinking it was the Sultan's yacht, as it was near the admiralty. This was considered very surprising, as it was presumed the minister charged with American interests in Turkey had at least informed our Government where the *Scorpion* was located. On occasion of these last bombs falling near ship hot gas was blown over ship. Shrapnel fell on ship during nearly every attack, on account of our central location. The morale of the crew was distinctly shaken after the last occasion and the steady bombing of August; and at this time it was requested that *Scorpion* be moved to Beicos, up Bosphorus; but no action in this connection was taken. The population was very frightened by the attacks, and particularly at time mentioned—end of August, 1918. Material damage, however, as indicated, was not very great.

THE CONCLUSION OF THE TURKISH ARMISTICE.

In August, 1918, upon urging of the new Sultan, the Turkish Government decided to force a general peace, or to make peace separately, and hints to this effect were given in Berlin, and it is said that the trip of the grand vizier (then Talaat) was really for this purpose (instead of to discuss Caucasus affairs, as announced). In

September the Government had fully decided to begin negotiations; but no way could be found to communicate with the outside world, as Germany or the Germans had by then effected absolute control over all the communications from Turkey. This remained the situation in Turkey until suddenly they were surprised by the Bulgarian armistice coming first, and then the Turkish Government became openly rebellious to Berlin, and together with Austria forced the joint note from the central powers. It is stated by members of the former Turkish cabinet that Turkey's application was in this case also held up in Berlin; and whether true or not this irritated the Turks more, and finally in desperation they sent their chief prisoner, Gen. Townsend, then at Prinkipo, to see what terms could be made. Gen. Townsend went out via Panderma and Smyrna to the islands, where he met the British admiral, accompanied by his own Kut aid, Maj. Moreland, and by his Turkish aid, Commander Tewfik Bey; and after preliminary discussion of the conditions of an armistice possible to the Turks, continued on to England. Tewfik Bey went disguised as an English prisoner, and his status was kept secret from the French of the allied force. He was returned to Smyrna in an English aeroplane and returned to Constantinople before it was learned locally that Gen. Townsend was missing. It was then decided to accept the armistice terms as proposed. The Talaat cabinet resigned and Izzet Pasha formed a coalition cabinet, and a commission including the two naval officers, Tewfik Bey (Gen. Townsend's aid, as mentioned), and Raouf Bey (who had become minister of marine in Izzet Pasha's cabinet), again went out to meet the British Aegean admiral, and signed the armistice as finally concluded. The above is from statements by said Tewfik Bey and Raouf Bey and is believed to be essentially correct.

FLIGHT OF UNION AND PROGRESS LEADERS.

As soon as Izzet Pasha became grand vizier, the two notorious former chiefs of police of Constantinople, Bedri Bey and his successor, Azmi Bey, attempted to leave the country in a small merchant vessel, but this was stopped at the Black Sea mouth of the Bosphorus and the two taken off and brought back to the city to be interviewed by the grand vizier.

Shortly afterwards it was learned that the famous former general of intendance of the Turkish Army, Enver's right-hand man, Ismail Hakki Pasha, had succeeded in escaping in disguise. He went to Odessa.

On November 1, immediately it was known the armistice had been signed, Talaat, Enver, and Djemal Pasha also disappeared. According to best evidence, these went as follows: A German motor boat touched at the quay of Enver's summer house on the Bosphorus at 1

o'clock that night and took off Enver and Talaat and put them on a German destroyer near by. Djemal went aboard the destroyer independently, using another German boat. The destroyer then left for Russia, according to best accounts; and from there the fugitives are supposed to have made their way to Berlin, though some think all or part of them went to the Caucasus. At 2 a. m. the same night—after they had safely escaped—guards were put on the houses of all to prevent their flight.

Their escape is believed to have been contrary to the wishes of the grand vizier, Izzet Pasha; and it is said to have been accomplished with the assistance particularly of Fethi Bey, then minister of the interior.

A few days later it was found that Bedri Bey and Azmi Bey had also escaped; nearly all the more prominent members of the former Government have succeeded in disappearing. This was finally one of the determining causes of the fall of the Izzet cabinet, which was in office only 25 days.

Upon the intervention of the Sultan, Tewfik Pasha then formed the present cabinet—which contains no one concerned with the former governing clique; and finally the Chamber of Deputies, composed principally of Union and Progress members, was also dissolved in the latter part of December, so that at present the Union and Progress Party of the Enver-Talaat-Djemal days no longer has any part whatever in the Government.

EXECUTION OF THE ARMISTICE AND PRESENT CONDITIONS.

Several weeks elapsed after the signing of the Turkish armistice before any entente ships, officers, or commissions entered Turkey; and in the meantime the population got considerably excited and all kinds of reports were published. Finally, the first commission (British contact or liaison commission) arrived on the Turkish destroyer *Basra* at 9 p. m., November 7, 1918. They were met upon their arrival by the commanding officer of the *Scorpion*, who worked with them considerably concerning the local Germans, German agents and spies, German ships, etc. About November 15 a second armistice commission (also British), for intelligence service, arrived. Then, soon afterwards, the entente fleet came in with many other commissions. The entente fleet which entered Constantinople consisted of the British flagship *Superb*, *Lord Nelson*, *Pyramus*, and other ships; of the French ships *Diderot* and others; and of several Italian and Greek ships, including the *Lemnos* (former U. S. S. *Idaho*). As the ships present continually changed, it was impossible to keep exact trace of their movements. The entering of the Greek ships considerably irritated the Turks, as they understood, or claimed to have been given to understand, that no Greek ships would

enter with the fleet. The moment the first ships were sighted, between 7 and 8 a. m., all the foreigners in Pera began to put out all their own and all the entente flags; everyone sought a favorable place to watch the ships and a veritable pandemonium broke loose, the pent-up feelings of four years of a great majority of the Ottomans, including many of the Turks, being given free play. Although there were orders that all restaurants, etc., should close at 12 midnight, everyone stayed up most of the night. Many of the shops also exhibited photographs of the leading British, and particularly French, generals, of Venizelos, Lloyd-George, Poincaré, Clemenceau, etc. But though there were few American flags in town, there were more photographs of President Wilson shown than of all other personages together. This lasted for two or three days, the Turkish police attempting no interference whatever, and then it was stopped without any difficulty and affairs reverted toward somewhat normal conditions.

Enormous numbers of commissions soon arrived, and particularly British; a diplomatic commission, police commissions, intelligence commissions; various military and naval commissions; also several "armistice" commissions, with no other designation. The British Middlesex Regiment also arrived and occupied a building in Pera previously used by the Germans; and since then other British troops have been coming in at frequent intervals. The French have brought about 15,000 troops to San Stefano, and have also occupied the Black Sea Bosphorus ports. French and English have occupied the Dardanelles forts. The remaining German troops (about 12,000) and also the notorious Marshal Liman von Sanders, have been interned at Haidar Pasha and on the Princess Islands until they can be sent out of the country. The British have become intrenched in Turkey firmer than before the war, and in all probability will continue so. The other members of the entente, even including the Japanese, have also opened their embassies or legations (such as had them), and followed suit with commissions, etc., but have been left far behind, except possibly the French. Up till December 26, 1918, however, there was still no regularly accredited American representative or commission; American interests were under the charge of the Swedish minister, who is pro-German, and also has charge of the German and Bulgarian interests; no American ships had come, except the *Nahma* and *Scorpion*, which were at Constantinople, as indicated, without special instructions or authority, and there was no direct special American communication or means of travel. There are numerous Americans here who desire to leave the country and only part of whom have been able to do so, through the courtesy of the Greek or British authorities; and the Turkish authorities and all elements of the population desire a direct Ameri-

can communication and representation and that American ships should come. The Armenians, both those deported who remain alive and the other poorer elements, are in a terrible situation, and without exaggeration still dying from starvation and lack of shelter by hundreds; none of the commissions coming had hitherto (26 December 1918) done anything to assist them, though the British (alone) had at that time just begun to take up this question and give some half-hearted assistance.

GERMAN NAVAL COMMENT.

GERMAN ATTACKS ON PERSIUS.

(10893A.)

The following open letters to Capt. Persius, criticizing his articles (translations of which were published in O. N. I. Semi-monthly Compilation, Series LXV, page 65, and Monthly Information Bulletin, No. 2, 1919) were received too late to insert in the last number.

I.

7 December 1918.

Source: Deutsche Tageszeitung.

Two articles have been published by you in the Berliner Tageblatt under the titles of "How it happened," and "The ill-treated spirit of the fleet."

These articles are likely to give the German people an entirely false impression of the activity, accomplishment, and value of the fleet. That the relations between officers and men were not always as they should have been, and that the younger officers especially, in their treatment of their subordinates, were often at fault, is agreed; but your representation of conditions is grossly exaggerated. The origin of the revolution in the navy is not to be sought in the relations between officers and men. In your articles there is lacking any allusion to the fact that a great number of officers possess the full confidence of their men; and, further, that through the losses sustained among the superior officers during the U-boat war, the better class of officers became ever fewer in number.

That you, Herr Persius, should deplore the ill-treatment of the men, amazes me; for you were one of those officers who, speaking according to the present point of view, may be designated as a nuisance in the line of discipline. Do you not remember your actions when you were executive officer? Let me assist your memory. At that time you annoyed your men—that is, the engine-room personnel—in

every way possible. Thus, while the sailors were allowed 12 hours' liberty, the engine-room crew, for insignificant reasons, were frequently allowed only 9 hours. And the Sunday inspections! How often, on account of some trivial matter, you deprived your men of shore leave, even the old warrant and petty officers! Because of a small drop of water which you, in the course of such an inspection, discovered in the bath, you would deprive the men of their leave by making them clean and inspect the baths. But enough of these unpleasant matters; they belong to the past.

Now, for your criticism of the activity of the German fleet. You write that our fleet was condemned to inactivity. How did you acquire this knowledge? It is probable that you know nothing of the strenuous mine-sweeping operations, which could not have been carried on without a strong naval escort, as the enemy had laid a girdle of mines at a distance of 200 kilometers off the German bay in the North Sea.

The fact that, after the Skagerrak fight, no great battle between the German and English fleets took place is not our fault. It never occurred to the chiefs of our fleet to engage the united English fleet in the open sea. Our activities were directed against units of the English fleet, and we engaged the English main forces in battle only when circumstances were such as to insure our success. The report which is being spread at present among the German people that our fleet would have been willing to sacrifice itself is false. How this report started has not been made clear; perhaps it was a means to an end for one or the other side.

I wish to call attention to a few enterprises undertaken by our fleet: Some weeks after the Skagerrak fight we went in close to the English coast. The English fleet was at sea at the time. Our advance had been reported. Late in the afternoon English light forces attacked us. Last spring the fleet made a similar move above Bergen, and at the time the *Moltke*, near the Norwegian coast, suffered serious damage to her engines and was unable to move. With great difficulty, and escorted by the entire fleet, she was towed to Wilhelmshaven. The fact that on our homeward route we were attacked by English submarines, and that we found that the enemy had planted mines in our return course, proves that he had been notified of our venture. In both cases it would have been possible for the English, with their fast battleships and armored cruisers, to have at least taken our ships but they failed to do so. The riddle is easily solved.

In the Skagerrak fight the superiority of our new material—your opinion to the contrary, Herr Persius!—demonstrated to the English that, without doubt, their losses would be heavy in any naval battle. Therefore, they reckoned shrewdly that should Ger-

many win the war on land the English fleet would be a weighty factor in the peace negotiations, and consequently should not be weakened or sacrificed; and if Germany should lose the war on land they calculated that an undamaged fleet would be a valuable asset.

The fact that the activities of the fleet had to be kept secret was due to the manner in which the war had to be carried on. Even with the danger of being thought inactive, we were forced to keep silence, our one comfort being the belief that later on we would be able to vindicate ourselves.

With regard to the value of our fleet in this war, controversy is not yet at an end. But has it been considered what would have happened to us if England had ruled the Baltic at the time when Russia was still at the height of her power? The Baltic and the sound can not be defended against a powerful enemy by submarines and mines alone—they must act in conjunction with a strong naval force. And here, I wish to warn against overrating the powers of the submarine. The U-boat is now, in a military sense, an incidental weapon, which, with the modern means of defense, can be used to make an energetic attack. A success such as Weddigen had will not be repeated. Our coasts, during the war, have remained unmolested by the enemy, not on account of our submarines and mine fields, but because back of them stood a powerful fleet that forced even an enemy of superior strength to hesitate before attacking.

Our nation is now at the critical hour of its history. Nothing is more necessary to us than quiet, prudence, and unity. At a time like this, your two articles are nothing less than seditious, since they help to encourage hate and dissension. A man who loves his country tries his utmost to unite it, not to divide it.

REDING,
Chief Quartermaster with the High Seas Fleet.

II.

Source: Wilhelmshavener Tageblatt.

7 December 1918.

Following your accusations against the administration of the navy, you have seen fit, in your article entitled "The ill-treated spirit of the fleet," to attack the entire corps of naval officers, forgetting that you are fouling your own nest. Your attempt to fasten the blame for the unspeakably bitter fate of the fleet on its officers fills them with rage and disgust.

It is useless for you to make the plea that you do not accuse the system, but individuals. This statement at the close of your article does not excuse you. Your actions give it the lie.

To refute your unscrupulous and blatant misrepresentations and untruths in detail would require days. But the most flagrant may not pass unanswered.

You hear the question asked by "outsiders" where "the spirit of revolution" appeared first in the fleet. Every schoolboy learns in history that all revolutions, from the Ionic uprisings of 500 B. C. to the Russian revolution of 1917, have broken out first on the ships. It is obvious that this is not known to you, Herr Persius!

However, the plan for the revolution did not originate in the navy, but was introduced there from outside.

You say that the fleet was in the clutch of "Prussian militarism" long before the war. This statement is contrary to every opinion which, before the war, was expressed concerning our navy, not only by unbiased inland Germany, but also by the English and Americans, who mocked our "militarism"; the German naval officer was spoken of as a man of the world, a thinking man, with a broad and liberal point of view.

To your calm assertion that the crews of warships are easily led and easily contented, my reply is that, in general, sailors and stokers are more difficult to manage than soldiers. The reasons for this are many and can not be unknown to you, who were formerly an officer in the navy. They lie largely in the fact that among naval recruits a much higher percentage of intelligence and socialistic tendencies is found than in the army. Moreover, whether on a fishing boat or on a warship, strict "ship etiquette" plays an important rôle.

If, in spite of this, the relations between our officers and crews, with few exceptions, were sound and friendly, it was due to the fact that in handling their crews the officers showed "a little heart" as well as the necessary firmness. We possessed the confidence of our men, even when at war. Who robbed us of this confidence you, perhaps, know best.

That the long forced inactivity of a large part of the high-seas fleet, the monotonous outpost duty, etc., was bound to have an unfortunate effect is only natural. No one was so little to blame for this state of affairs than the naval officer; no one has more to endure. Skagarrak, the glory of the fleet, which you, with malicious criticism, attempt to belittle, came as a happy release to us.

By every conceivable means we endeavored to help our men through the terrible time of waiting. We went on excursions with them, gave them concerts; on board ship there were sport contests, theater, music, books, and newspapers. The arrangements for leave, provisioning, and the family mail were the chief care of the first officer. Military service was only enforced in so far as to insure the

proper attention being given to all weapons. To speak of "continual drill" is laughable.

The longer the war lasted the more evident became the good comradeship among both sailors and stokers. Many came to us with entirely personal requests, and many an officer has spent his free moments in conducting entire lawsuits for his men.

The punishments for a breach of discipline were usually of as mild a nature as possible. In a crew of perhaps 1,200 men arrests were infrequent. Nothing shows so well the confidence of our men in the military administration of justice as the fact that by preference they would choose the officer acting as judge for their counsel. Instances of ill treatment of the men by officers were rarely met with during the war. Therefore, when you speak of "unworthy treatment" and the "severe punishment for the slightest fault," you should bring proof.

Your statements concerning the provisions for officers are a masterpiece of misrepresentation. For instance, officers are only provided with food on board ship; therefore they are forced to take their meals with them on land if they wish to eat at their land quarters. The married under officers and members of the crew naturally do likewise. Of this you make no mention; instead you make the unheard-of charge that the food which was destined for the crew was carried off the ship by officers. No word is strong enough to characterize this malicious lie.

While we, through the unspeakably difficult years of the war, did everything to uphold the spirit of the fleet, you, Herr Persius, were far from the labors of service on board ship, and constituted yourself the recipient of all complaints, wishes, and troubles of every disgruntled member of the Navy. Every bit of Wilhelmshaven gossip that was brought to you was welcome "material." Truly an occupation of which you may be proud!

As long as our Navy retained its strength you were its champion. Now you have openly adopted the rôle of the donkey who kicked the dying lion. The part is suited to you; go ahead, Herr Persius!

Lieut. Friedrich Fikenscher.

PERSIUS ON SUBMARINE WARFARE.

28 December 1918.

Source: Berliner Tageblatt.

Reference: Daily Review of the Foreign Press—Enemy Press Supplement, 9 January 1919.

In an article in the Berliner Tageblatt (Dec. 28, 1918) entitled "Just two months longer," Capt. Persius endeavors to prove the fallacy of the idea, to which many Germans are still clinging, that the

U-boat warfare would have brought England to her knees had the war been prolonged another two months. He quotes the figures given in an English White Book, concerning the state of the world's merchant shipping, published on December 5. According to these figures, Persius declares that none of the allies could ever have thought of asking for peace. He pays a striking testimony to the truthfulness of the English shipping reports, which all through the war have stood out in striking contrast to the falsified German reports, which, he states, entirely misled the German people.

GERMAN DISCUSSION AS TO FUTURE OF NAVAL OFFICERS.

Source: Der Tag, Berlin.

13 December 1918.

Under the heading "What will become of our naval officers?" H. D. contributes the following discussion:

This is the question which is asked not only by naval officers themselves but by many of our people.

Almost our entire fleet and all of our submarines are in the hands of our enemies, and our only hope is that, when peace is concluded, they may be so generous as to give back to us a part, at least, of our navy. Even if we should have the good fortune to recover the whole, the financial situation of our country would not be such as to permit the maintenance of as large a navy as we had before the war. The idea of demobilization, entertained by our enemies in the first flush of victory, but which will not be feasible for some years to come, need not be taken into consideration. The fact with which we have to reckon is that it is more than probable that at least one-half of our naval officers will enter other professions. Among them are many elderly men, to whom the taking up of an entirely new calling is bound to be most difficult, but who, nevertheless, since they have families dependent upon them, will be obliged to seek a new source of income. Those to whom work is necessary must be distinguished from those who have adequate private means.

The next question to be considered is, for what form of employment the officers will be best fitted.

The three and a half years' instruction of the naval officer, and his later essentially practical experience, would make it seem that he is especially fitted for a practical calling. A nautical education produces a nautical "point of view," which may be called in general "a practical point of view." His knowledge of navigation is founded on an extensive knowledge of mathematics and natural science. In addition, the always increasingly complicated equipment and weapons of our warships, necessitate a fairly exact knowledge of various

technical branches on the part of naval officers; for instance, fine mechanics and electro-technique. To these more special forms of knowledge is added the experience in organization, common to all officers, which often qualifies them to take the leadership in various branches of work. But especially valuable is the comprehensive grasp of affairs, which so many naval officers acquire from their voyages to foreign countries.

For what province, then, in the economic life of the nation is the naval officer best fitted? It is true that the merchant fleets of the world lack efficient seamen, but not the German merchant fleet, the greater part of which we have already lost, the fate of the remainder being undecided until after the conclusion of peace. Moreover, the losses during the war, among merchant marine officers, were less than the losses in ships. Therefore, in this domain also, loss of occupation is threatened, and what would otherwise be so suitable a berth for the naval officer is out of the question.

In a national air merchant service, which must come if we wish to profit by the immense progress made during the war in aviation, there would be great possibilities for employment. Here the naval officer with his knowledge of navigation, his nautical and technical knowledge, would be of the greatest use; the officers of the Army flying corps would be also well fitted for the same calling. Such an organization would offer great opportunities for employment, not only to naval officers, but to the active under officers of the Navy as well. Finally, for elderly officers, who are unfitted for the more dangerous business of the service, there would be open a number of other branches. There would be positions for directors of different kinds of technical work to be filled, especially in the domain of wireless telegraphy, in which the majority of naval officers are particularly well grounded. For the younger officers there would be an equal number of openings. Naval officers with a knowledge of languages could be employed with advantage in foreign countries as commercial agents.

Finally, after this tremendous war, there will be many naval officers who will be in need of rest and quiet, and these should be given pecuniary assistance by the Government, and allowed to form colonies on the Crown or other Government lands. Thus many a seaman would have his own bit of earth to care for.

At any rate something must be done quickly. In order that everything may be in readiness, it is the duty of a grateful Government to come forward with adequate remuneration for the courageous soldiers, marine crews, and sailors of the entire fleet, who for four long years have cheerfully performed their dangerous and arduous service in our behalf.

The question remains of how these ideas may best be made to materialize. It would seem most appropriate that the selection of position should be a part of the duties of the secretary for demobilization, under whom should be a department for the promotion of the air merchant service, which would be managed to the best advantage by army and navy authorities in aviation. Besides the individual departments there would be a central department having to do directly with applications for employment or for discharge from the navy. All this must be called into being quickly before it is too late. That is our duty to our naval heroes.

GERMAN PLANS FOR A NAVAL OFFENSIVE IN OCTOBER, 1918.

Source: Reliable. **24 January 1919.**

(10893.)

In a Berlin paper, Der Tag, Korvettenkapitaen (Lieut. Commander) Hintzmann, who signs himself "Admiralty Staff Officer of the Naval Command," publishes the following:

FRUSTRATED NAVAL ATTACK.

After it became known toward the beginning of October that the coast of Flanders was in danger, the naval command concluded to make a general attack with the whole fleet, in order to unburden the right wing of the army, either directly by injuring the enemy on his connecting line, Thames-Flanders, or indirectly by a general menace and interruption of traffic through the general attack. The weather situation in general (thick weather during the whole month of September which made mine sweeping nearly impossible) and the general military situation did not permit the attack to be made before the end of October. Preliminary conditions for the enterprise were—

(*a*) To keep the matter a secret as long as possible, so that the start from Heligoland Bight would have to be made in a long and dark night, so as not to expose the fleet to a sudden meeting with strong superior enemy forces.

(*b*) To have a sufficient number of submarines ready on the approaching route of the enemy's fleet in order to inflict as much damage on it as possible.

These U-boats were now available, as the U-boat war had been suspended at the beginning of October, but they could not reach their destination in sufficient numbers before the end of October, 1918.

From these general conditions the enterprise was planned as follows:

The fleet was to take up its march from Heligoland Bight out of sight of land in a westerly direction, so that the forces would reach the mine belts which encircle the German Bay between Terschelling and Horns Reef after dark. All mine-sweeping forces had been concentrated at this time in order to bring the fleet through these mine belts into the neutral mine-free channel to the west of the mine belts.

It was then planned that during the night two groups of light forces, each consisting of several small cruisers, would make raids against the coast of Flanders and the mouth of the Thames, respectively. The order provided that these groups were to attack at the mouth of the Thames and at the coast of Flanders the enemies' forces there at the break of day and to retire an hour later. To give them backing against any possible enemy forces in the Hoofden—only parts of forces, and weak ones at that, came into consideration, as we had found out from reliable sources—the commander in chief of the scouting forces had orders to accompany the two groups a part of the route during the night with the armored-cruiser squadron and a sufficient number of torpedo boats, and to pick them up again the next morning.

The main body of the fleet finally was to follow at reduced speed as main cover (Rueckhalt) only so far that it would be again in the neutral channel not later than 5 o'clock in the afternoon—that is, before darkness set in. From there it was to return to Heligoland Bight under the protection and with the help of the mine-sweeping units.

The plan was kept strictly secret and was only known to the officers of the fleet staff, the commanding officer of the mine-sweeping flotilla and the submarines. Only a few hours before the start (intended start) outlines of the plan were made known to the sub leaders. It was therefore impossible for officers to be granted leaves of absence in the face of the enterprise, or that letters of leave taking could be written or other preparations made.

If we consider the whole situation of the enterprise, it shows that there was considerably less risk in it than there was, for instance, in the raids of our torpedo boats in February, 1918, in the Straits of Dover, or in the different enterprises of naval forces for the purpose of bombarding the English east coast.

This plan had, however, much better prospects of success. We had more torpedo boats and better torpedo boats than formerly, and we had our submarines which had been brought up to the highest degree of efficiency during the four years' war. In large numbers they had already taken their positions of observation and of attack on the day

before the commander in chief had assembled the fleet on the outer Jade. An additional number of U boats were to start with the fleet to cover its rear. Close to the entrances to the Firth of Forth were the first lines of U boats, about in the center between the place in the neutral channel from which the fleet was to take up its march to the south and the Firth of Forth was a second line of submarines and much closer together. These lines of submarines had to be crossed by the fleet of the enemy if it desired to take up a fight. The enemy fleet, therefore, could not approach without being first vigorously attacked by our brave submarine men. In addition to this: Between the second U boat line and our place of sally, small cruisers and auxiliary cruisers (the old efficient *Moewe* was one of them) were to lay extensive and efficient mine fields on the march route of the enemy. These ships were also ready on the evening when the fleet assembled for the intended start.

Were such preparations made to sacrifice the fleet?

No; this operation was planned so that if the English desired to fight, they could have it only under the heaviest losses before the beginning of the battle. It was planned that our fleet, if the British would engage in spite of the losses which they might sustain previous to it, would go into the struggle under the most favorable conditions.

We had designated time and place of fight, the time was chosen that a meeting of the fleets could only take place shortly before sunset, the place was chosen in such a way that our torpedo boats could undertake the long looked-for night attack on the English fleet and to allow the big ships to retreat behind the mine fields, owing to the efficient work of our mine-sweeping flotillas. Was this a self-sacrifice without purpose? No; it was the attempt to utilize the unusual favorable situation of the whole sea to inflict a severe stroke on the enemy.

It turned out otherwise. *The crews of our large ships abandoned their comrades of the U boats who were waiting on the designated places; they refused to cover their comrades on the light craft who, imbued with the sense of duty*, did not hesitate a moment to meet the enemy, and never entertained the idea of not carrying out their orders.

Yes; but why did you not tell us that? will now be the cry. The answer is very simple. Don't belie yourselves, you men of the big ships. You know very well that in the last few years, before all communication with the land was cut off, such intentions were never published, because it will not do to publish them. You also know that spies were all around us and how they acted. Why did our armored cruisers get into a difficult position on the 24th of January,

1915? Because their start and their intention was known to the English. How easy would it have been for the fleet command to lead the fleet to sure death, if it had had the intention to do so! It would only have been necessary to make their intention known beforehand; our route would have been closed then by enemy U boats and mines. This everyone of you should honestly bear in mind. As to the "naval attack of 1918" history will pass judgment. The judgment will be annhilating for the men who paralyzed the big ships.

APPENDIX.

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE FEBRUARY 8–MARCH 8, 1919.

Subject.	Date.	Pages.	Reference number.	Remarks.
AVIATION.				
Air raids on Paris	4 Jan. 1919	9	10512	Extract from L'Illustration (French periodical) description of air raids and fire of long-range gun.
Brandenburg seaplanes	18 Jan. 1918	[1] 6	11197	From Bureau of Construction and Repair; description of (*a*) biplane and (*b*) monoplane.
British air situation	5 Feb. 1919	25	11265	Comment from British press regarding aviation—its future, its commercial possibilities, etc.
Organization of British air service.	24 Jan. 1919	12	8534	Report dealing with aviation situation at date, and inclosing copy of article on the same subject by Lord Sydenham.
Seaplane and airplane stations in Italy.	Nov. 1918	.....	11185	Two maps, showing airplane and seaplane stations, and present and projected aerial routes.
COMMUNICATIONS.				
Determination of differences of longitudes between certain geographical positions encircling globe.	23 Jan. 1919	9	11224	Report transmitting article (in French) and translation on above subject by Col. Ferrié, the technical director of the French military radio telegraphy.
Italian radio station	27 Jan. 1919	2	11156	Circular of Italian ministry of marine dealing with radio service, and time-table of operation of radio station.
Norwegian radio stations	20 Jan. 1919	18	.....	Complete list and full details of Norwegian radio station.
Protocol of interally radio commission.	18 Dec. 1918	25	8306M	Secret.
Do	25 Jan. 1919	120	8306N	Do.
Do	1 Feb. 1919	22	8306O	Do.
Radio stations, Russia	15 Feb. 1919	1	1338	List of radio stations in Archangel district.
Radio telegraph stations, Japan.	13 Jan. 1919	3	5559	Description of Japanese radio station, Dairen, Manchuria.
Radio telegraphy in Uruguay.	2 Jan. 1919	2	3316	List of radio stations in Uruguay.
CONSTRUCTION AND REPAIR.				
Austrian submarine *U 5*	25 Jan. 1919	4	5854	Captured Austrian report on details of construction.
Concrete ships	6 Feb. 1919	5	8514F	Copy of letter from Hawiian agent of an English firm to the president of a Japanese shipyard regarding above.
Italian shipyards	10 Feb. 1919	1	1602	List of Italian shipyards with number of slips for naval or mercantile construction.
New construction, Japan	15 Jan. 1919	2	9324	Launching of 1, and laying of keels of 5 new Japanese destroyers reported.
Paulin electric log	July 1918	[2] 8	11225	Description of new log developed in Sweden and trials on Swedish submarine.
INTERNATIONAL SITUATION.				
Japan's peace terms	2 Jan. 1919	6	11157	Translation of articles in Japanese newspapers and magazines.
	18 Dec. 1918	5		
	18 Dec. 1918	5		
League of nations	2 Jan. 1919	8	10796B	Japanese views regarding.

[1] Also 2 plates.

[2] Also photos.

Digest of reports received by Office of Naval Intelligence—Continued.

Subject.	Date.	Pages.	Reference number.	Remarks.
MISCELLANEOUS.				
Essays and Addresses in War Time.	— —— 1918	187	11194	By Viscount Brice; a collection of 8 essays on timely subjects.
Health for the Soldier and Sailor.	— —— 1918	148	11207	By Fisher and Fisk; a book of 6 chapters on hints for preserving health.
Iron and steel industry, Japan.	2 Jan. 1919	12	5933A	Discussion of above from Japan Financial and Economic Monthly.
Japanese steamship lines	20 Jan. 1919	13	11232	Statistics showing expansion of Japanese carrying trade during the war.
Norwegian merchant marine	16 Jan. 1919 30 Jan. 1919	2 1	9297F	Table of losses during submarine war and figures of construction; quotation from Norwegian newspaper concerning tonnage and building.
OPERATIONS.				
Archangel, Russia	30 Nov. 1918	37	11077	Intelligence reports on various aspects of the Archangel-Murmansk front.
British Naval Demobilization.	24 Feb. 1919	16	11256	Pamphlet published by ministry of reconstruction, giving instructions to enlisted men on demobilization.
Italian naval uniform	29 Jan. 1919	1	9055	New Italian uniform for shore duty described.
Japanese naval program	18 Jan. 1919	1	7206A	Japan in market for German Diesel engines.
Naples, Italy	8 Dec. 1918	3	11217	Plan for enlarging port described.
Precautions for merchant shipping.	14 Jan. 1919	1	8783	Admiralty orders relative to stern lights.
Spanish fleet organization	27 Jan. 1919	9	7527	Statement of efficiency of the various ships of the Spanish Navy.
Stations of Japanese naval officers.	31 Dec. 1918	30	11213	List of officers of and above rank of lieutenant commander.
Treatment of prisoners of war	23 Nov. 1916	13	4541K	Translations of German regulations regarding.
Do	22 Jan. 1918	8	.....	Report of commander armed guard steamship *Campana*.
German submarine losses	— Jan. 1919	33	9497F	Final admiralty report including fate of all German submarines.
ORDNANCE.				
Automatic rifle shooting devices.	28 Jan. 1919	.....	11284	Description of invention being tried out by Denmark for control of rifle fire during the dark.
De Quillacq and Fromaget retarded ignition mine.	— Jan. 1918	[1] 30	100443	Translation from Italian of article describing above at length, with cuts and plates.
Drifting Mines and Their Dangers for Navigation.	28 Jan. 1919	[2] 8	11234	Pamphlet in French by Albert, Prince of Monaco, on effect of currents on mines, with chart.
German fuses	1 Nov. 1918	8	1383	Translation of French description of German naval fuses and detonator, with drawings.
German naval guns	.....	3	10442	Description of demolition of guns in Flanders. (No evidence of reliability of source.)
German munitions captured by French Army.	— Nov. 1918	[3] 33 45	11050N 11050O	Various forms of bombs, shells, etc.; photostat of official French report (untranslated).
Italian mine sweeping during the war.	30 Jan. 1919	[4] 31	11289	Series of maps of Italian coast showing mine fields and sweeping done.
Mine Clearance Report	1 Jan. 1919	9	11252	Copy of British Admiralty Mine Clearance Report, No. 1.
Mine Fields, Mediterranean and Adriatic.	29 Jan. 1919 3 Feb. 1919	2	4621F	Sailing directions for avoiding danger zones. Copy of Italian Notice to Mariners regarding above.
Note on explosives, enveloped powders.	29 Jan. 1919	14	11236	Report on above inclosing article by Gen. Bourgoin of the French ordnance department with translation.
Torpedoes on aeroplanes	25 Jan. 1919	1	4859	Extract from a report found on Austrian ship.
British naval targets	1914–1917	29	11288 11288AJ	Instructions regarding manufacture and use, with 10 blue prints.

[1] Also photos. [2] Also chart. [3] Also 2 tables. [4] Also 29 maps.

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CONFIDENTIAL

Number 4—1919

OFFICE OF NAVAL INTELLIGENCE

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MONTHLY INFORMATION BULLETIN

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15 APRIL 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 April 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A digest of reports received during each month by the Office of Naval Intelligence is appended to this Bulletin. In case an officer has a special interest in any subject appearing in this digest, a copy of the report will be provided him on application to the Office of Naval Intelligence.

GEO. W. WILLIAMS,
Captain, United States Navy,
Acting Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE
NAVY DEPARTMENT
Washington, D. C.

MONTHLY INFORMATION BULLETIN

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15 APRIL 1919.

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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AUSTRIAN BATTLESHIP *PRINCE EUGEN.* (Frontispiece.)

CONSTRUCTION AND REPAIR.

GERMAN SUBMARINES.

Source: Inspection by Commander E. S. Land C. C., U. S. N. Continuation of Report of Rear Admiral S. S. Robison, U. S. N.

8 January 1919.

DIMENSIONS, ETC.

	Length over all.	Breadth.	Draft.	Displacement.	Torpedo tubes.	Guns.	Mines.
	′ ″	′ ″	′ ″				
U57	220 0	20 4	13 0	800 / 1,120			
U79	193 0	17 6	16 4	650 / ?	1 forward ext 1 aft ext	1—3½″	36—2 tubes.
U103	220 0	21 3	13 1	780 / 1,100			
U112	230 0 276 0	20 0	13 4	850 / 1,200			
U124	P.H.203 0 275 0	23 3	14 8	1,200? / ?	4 bow 20 torpedoes	2—5″9	42—2 tubes at stern.
U135	P.H.215 0 301 0	24 6	14 6	1,600 / 2,000?	4 bow, 2 stern 12 torpedoes	2—5″9	
U139	P.H.240 0	27 0	19 10	2,000 / 2,500?	do	2—5″9	
U155 (Deutschland).	213 8	29 9	14 9	1,700 / 2,100	2 bow	2—5″9	
U164	232 0	20 0	13 2	860 / 1,200	4 bow, 2 stern, 12 torpedoes.	1—4″1	
UB101–106 (A)	181 0	19 0	11 6	500 / 650			
UB149	183 0 185 0	19 0	12 3	558 / ?	4 bow, 1 stern 10 torpedoes	1—4″ 1—3″5 A. A.	
UC90–117	P.H.137 6	18 7	12 0	526 / 729	1 stern tube, 2 deck tubes (4).	1—3″5 A. A.	18.
UC105	182 0	17 6	12 4	530 / ?			
AU48(A)	240 0 181 4	22 0 19 4¾	10 10	830 / 1,180			
UB110	P.H.132 2	(1)	12 1¾	523 / 736	4 bow tubes, 1 stern tube.		

[1] Over rudders P. H. 12′ 9½″.

WORKMANSHIP.

The workmanship is very good to excellent throughout the boats. The shipfitting work is well done; riveting uniform with little evidence of "drifting"; no indication of patch work, errors in punching or laying off, etc., were noted.

A few leaky pipes, valves and stuffing boxes were noted and the British reported some leaky tanks which gave trouble when the boats were towed to the various ports from Harwich.

There was plenty of evidence of minor efforts at sabotage, such as removal of small but essential parts, blown fuses, cut electric leads, missing spares, waste in pump fittings and motor fittings. This varied in the boats, some being practically operable as soon as the intricacies of the leads and the language was solved, others being inoperable except after minute inspection, replacements, and defects remedied. "Souvenir hunters" worked a lot of damage in the usual way.

There was little evidence of shortage of material of any kind. Copper in external H. P. air lines in latest *U* boats is replaced by steel, but the torpedo tubes are of "metal" (bronze or composition).

Early engines are of bronze, latest of steel. Copper is undoubtedly short in Germany, but where essential for submarines it was obtained. Insulation in latest boats is defective, indicating rubber shortage, but the quality of the rubber for gaskets appeared to be first rate.

Mattress covers in latest boats are made of paper, indicating cotton shortage. There were other evidences of this. There appeared to be plenty of wood, both hard and soft varieties.

One outstanding feature of these boats is the lubrication of all auxiliaries, all valves, joints of shafts, etc. This is particularly noticeable in fittings exposed to salt water, such as hydroplanes, tube shutters, bow caps, etc. Grease cups loaded with grease abound, and where the auxiliaries, shafts, etc., are inaccessible, forced lubrication is applied by means of grease cups, and pipes leading from inside the boats, where it was simple and easy to lubricate the exposed operating mechanisms. This is a good feature and worthy of adoption even at the expense of complications.

While much attention is given to W. T. integrity and pressure Bhds., much of this is counteracted by the very large numbers of hull openings and multitudinous leads through the Bhds. On one Bhd. there were 35 electric lines alone, running through the Bhd. There are numerous "shove connections" through the I. H., even to the extent of an oxygen connection for charging oxygen flasks for air purification.

The boat's fittings are entirely too elaborate, complicated, and intricate.

Emergency fittings abound, many of which are not essential. There is ample evidence that public opinion forced some of these. There is evidence that the submarine service could get anything that was suggested; also that every effort was made to attract men to the submarine service by all sorts of safeguards, both essential and non-essential.

Orders, reports etc. were translated, showing that submarines had special food supplies.

Many of the older boats were modernized or made more comfortable by the addition of Officers' Quarters, insulation, wash rooms, small showers, transoms, lockers, etc. It appears that much more was done for the officers' comfort than for the men.

Boats, long in service or in from long cruises, were very dirty and ill smelling.

Some poor ship-fitting was noted in Vegesach Werft Bremen, also some very poor acetyline cutting.

TESTING.

Practically no test data was available in any form. It is evident that pressure Bhds. are designed to stand the same pressure as I. H.

It is evident from label plates that other tanks, piping etc., are tested or designed to stand 100% overload, i. e. twice the working pressure.

A gradual strengthening of the boats is in evidence in comparing the later with the earlier design. This appears more than likely to be due to war risks, such as depth charges, gun-fire etc., rather than normal structural reasons, as the frame spacing is greater in the later boats than in earlier designs.

There is at Kiel a submarine testing dock—a tank made of steel and mounted in a floating dock. It is cylindrical in shape with one end hemispherical. The other end was open and appeared to have a huge gate valve or sluice valve for closing purposes.

The estimated length of the dock is 315′, diameter 30′. It looked like a huge water main. We were told that all submarines of the latest design were tested in this dock to 75 metres depth pressure, which is equivalent to 250′ of water, or 110 lbs.

Tests. *U 57–U 62 class.* (*Form D. N. I.*)

Tanks.	Capacity.[1]	Test.
B. T. 1–6	164 tons	13′ head above tank top.
Oil fuel 1–4	87 tons	10′ head above tank top.
Regulation tank	35 tons	98½′ head bottom of tank.
Lubricating oil tank	15 tons	98½′ head bottom of tank.
Torpedo intermediate tank	1.13 tons	98½′ head bottom of tank.
Oil fuel, ready use	1.22 tons	164′ head bottom of tank.
Fresh-water tank	6.8 tons	6½′ head bottom of tank.
Trimming tanks	4.06 tons	98½′ head bottom of tank.
Forward torpedo compartment	2.95 tons	164′ head bottom of tank.

[1] Capacity in tons of fresh water.

STERN—STEM.

Sterns are generally similar, are built of steel castings in two or three parts, fitted with breast hooks as necessary, and rabbeted to take outer hull plating. There is nothing unusual or new in the design, as it follows ordinary submarine practice.

Stems of *U* boats follow normal submarine practice. Stems of *UB's*, *UC's* and *U* cruisers are of the clipper bow type. The former are built of steel castings in two pieces; the latter in two or three pieces—cruisers usually three pieces. In some boats the upper section is merely a heavy flat shape, probably rolled and not cast. This obtains in cruisers. In *UB's*, *UC's* and cruisers the stem is often fitted with net-cutters; that is, knife edge pieces or teeth inset into a frame, which is bolted or riveted to the stem extending from head of stem to about four to six feet below WL. The usual breasthooks and rabbeting are fitted.

Towing hawse pipe in bow of *UB 101* is part of stem and is in superstructure about 12 inches below top of stem piece. The hawse pipe or towing trough to tripping hook is secured to heavy pad, which in turn is secured to framing and plating by brackets. The whole appears comparatively light for towing purposes, but is apparently satisfactory.

Tripping line leads aft to T. R. This line pulls a pin, dropping a lever and thus releasing the link which lets go the tow line. There are no means of picking up tow line and making fast, except to reeve the tow line through the towing hawse pipe. The tow line is $1\frac{1}{2}$ inches dia.; wire rope served with marline. The line itself is only 1 inch dia., wire galvanized.

Strength hull is of peculiar shape in that it is not elliptical to regular shape aft to accomodate the mine tubes of the mine tube valve operating gear, as well as the screw gear for the vertical rudder. The upper radius of the aft end of the strength hull is increased 16 inches, just above the breach of the mine tubes.

Looking forward from the muzzle-door casing of the mine tubes, the mine tube valve operating gear leads into the inner hull and to a motor vertically installed over the mine tube (one for each tube), which motor operates either the muzzle sluice valve or the breach sluice valve. The operation is independent and controlled by a clutch.

These sluice valves or doors of mine tubes are of cast iron with 8 stiffening ribs. Two zincs are fitted on the inside of the breach door. This door or gate, once in place, is locked by a heavy cast steel locking ring, operated somewhat similar to the locking rings on the pressure bulkhead access doors. There is a rubber gasket on the door, and a forced fit is obtained by means of the locking ring.

The mine tubes are of built up plating, circular in section with a guide angle installed on either side along the middle line of the

tube. The mines are pushed along in the tube by means of 5 sets of star shaped wheels, the teeth of which penetrate the tube along the middle of the top. The tubes are made $\frac{1}{2}''$ steel plated.

The vertical star gear is an ordinary type of screw gear, and the connecting rod runs forward from the crosshead into the strength hull through a cast tube. This cast tube is bell-mouthed at the after end to permit athwartship play of the connecting rods.

Frames are installed both inside and outside the strength hull, and are of greater depth and thickness where the strength hull is enlarged. These frames are angle bulbs.

BILGE KEELS—DUCT KEELS—DOCKING KEELS.

No bilge keels are fitted so far as could be determined or seen on German boats. Austrian boats have bilge keels fitted about $\frac{1}{4}$–$\frac{1}{3}$ the length of the boat, i. e. 55′ long and the max. depth of 20″. German boats may have these bilge keels but none were seen on *UB 110* or *U 140* and none noted on boats at Germania Yard. However, *U* boats are reported to have fairly deep bilge keels in wake of C. T. fair water, i. e. in wake of regulating tanks low down on the boat.

Duct keels are not ordinarily fitted but there is a drain line in part of the keel forward and aft. Extent could not be determined. This is merely a "drainage canal" so far as determined.

Ordinarily the bottom strake of planting forms the keel amidships and as the hull curves forward and aft. the vertical keel or keelson increases in height, forming a fore and aft girder.

In Austrian boats the O. H. garboard strakes meet edge to edge on the keel line and the ordinary seam strap becomes the flat keel, being widened and rolled or flanged to suit. The inner keel, vertical keel, keelson etc. follow usual submarine practice. However, it is worthy of note that in most middle body tanks, the vertical keel or keelson is W. T., while at the ends it is Non. W. T. That is, end tanks run freely around the 1–H, while along middle body the tanks are distinctly port and starboard ballast tanks or fuel tanks.

Docking keels.—No docking keels are fitted in *UB's UC's* or *U* boats as far as could be ascertained. Large docking keels are fitted on cruisers *U 139–148* class and probably on *U 135–138* class.

U 140 was seen in floating dock in Kiel. Her docking keels are about 48″–54″ high at forward end, 12″–18″ amidships and 36″–40″ high aft. They extend about two-thirds the length of the boat, i. e. about 150′–200′.

Her lower underwater body looks to be too fine for stability purposes. She is rather peg-top in shape as compared with other classes.

The docking keels looked heavy, substantial and sturdy. It was impossible to get scantlings.

Rubbing strakes are fitted just above the W. L. on *U 140* class.

It is common practice to fit these rubbing strakes on all boats at the widest part of the hull. This extends about two-thirds the length of the boat (length depends on shape of outer hull) and the rubbing strake is extended to protect outer tanks as far forward and aft as necessary. This rubbing strake may be above or below the W. L. In most boats it is about 12 inches–18 inches below the W. L. On the Austrian boats (which are, by the way, much shallower draft than similar German types), the rubbing strakes are 12 inches–18 inches above W. L. The shallower draft of Austrian boats is one of their special designed features and is for use in Adriatic waters.

A comparison of designs is of interest and some plans were obtained which show the points under consideration.

The rubbing strakes are of wood on *UB's*, 4 inches deep, 2 inches wide, faired in at the ends, supported by angle clips top and bottom. On other *U* boats the strakes are similar but the wood is wider and deeper and the angles are heavier.

Drop keels have apparently been abandoned.

Ordinarily the keel is a box shaped installation forward and aft, in which box the fixed ballast is stowed. This ballast is in the form of cast iron pigs of about 25 kilos weight.

Portable ballast consists of these cast iron pigs and is installed as necessary.

BRIDGES, DECKS.

Bridges are on top of conning tower and are practically of same width, 4 feet–4 inches; all are of the chariot type but with many variations. Deck covered with wooden battens, all open at after end; chariot shape—high forward and lower aft with sides flared out at top. Height varies, but averages about 4 feet–4½ inches. Forward end of bridge is umbrella shape, extending aft from a few inches to 5 feet in *U 135*, forming a roof to bridge. *U 164* and *UC 105* have a sliding plate similar to a body hatch cover in centre of the top of bridge screen.

U 164 Max. width 60 inches, usable width 32 inches.

UC 105 Max. width 63 inches, usable width 24 inches, length 8 feet.

In these boats the air intakes and air exhaust pipes come up between outer bridge screen and inner bridge, leaving a rather narrow bridge for personnel. As bridge extends higher up than ends of air ducts, the width is regained, is plated over and is used for stowage or for sitting on. Forward end of bridge is fitted with two or three lockers.

The decks of wash rooms, W. Cs. and galley are tiled, or covered with red concrete or cement on latest boats.

SHEATHING.

A gradual increase in amount of sheathing in noted in later boats. Following is general practice in *U* boats. (a) No sheathing is noted

in torpedo room from forward torp. Rm. Bhd. (end of strength hull) to one or two frames abaft breech of tubes. (b) Sheathing in after end of torpedo room consists of $\frac{1}{2}''$ wood lining about 3″ from inner hull. This wood is covered with sheet metal screwed to wood lining. Sometimes the sheet metal is over the wood, i. e. on the internal side. The wood lining is secured to wooden beams or frames, which in turn are secured to steel beams or frames of the boat. The boat frames or beams are not lined in torpedo rooms. The dead air space varies from $1\frac{1}{2}''$ to 3″. (c) Sheathing in officers' quarters is similar except that frames or beams are also sheathed and in latest types the air space is full depth of frame or beam. Frequently small lockers are built in above and behind the sheathing in officers' quarters and other living spaces. Many access doors are fitted overhead and at side, to get at valves, piping etc. The system is extremely elaborate in officers' quarters and the wood paneling or lining is painted and grained with varnish finish, with white paint over insulation, outside living spaces. (d) Effort is made to insulate control room, but it is not entirely sheathed due to numerous fittings etc., and not insulated on *UB* and *UC*. (e) Engine room is not insulated. (f) Motor room is insulated. (g) Wireless room is wood lined for insulation purposes; thickness $\frac{1}{2}''$ to $\frac{3}{4}''$.

UB and *UC* classes. Very low grade linoleum or oilcloth over galvanized sheet metal is fitted for insulation outside of officers' quarters. This linoleum is green in color. Mine tanks are insulated along the passages on latest *UC*'s.

STRUTS—TUBES—SHAFTS—RUDDER.

Struts—usual submarine practice is followed; much attention apparently given to get stream line sections with wide flat palms.

There is a super-abundance of lines of shafting for auxiliaries throughout the boat—for steering rudder—forward and after hydroplanes—vent dome valves—bow ballast vents—towing line tripping device—operating kingstons—operating bow caps—mine release—for operating mushroom valves on air supply, exhaust and engine, engine induction etc. All these lines of shafting are made up on the knuckle joint principle. They are led as straight as practicable, but they are by no means straight leads in many cases. They penetrate pressure Bhd. and strength hull whenever their lead takes them.

Many of them are operated from control room, particularly vents, rudders and air valves. Most of the fore and aft lines of shafting are protected in each compartment through which they run, by a perforated galvanized, unpainted sheet metal tube.

Rudders—*UB* class. Most of these boats have two vertical rudders and this is generally standard practice. *U* boats and cruisers have only one vertical rudder. All boats of latest design except cruiser

class *139–148* have "drowned" hydroplanes, fitted low down in the boat, i. e. well below the W. L.

Early *U* boats had above-water bow planes, but these have been abandoned in all latest designs except *U 139–148* cruisers which have above-water bow hydroplanes. They fold forward and inward on the horizontal plane, overlapping each other in the stowed position. They project slightly even when folded. They are protected by guards above and below the planes in the "out" position. Sketches and plans show shape, size and operating mechanism in sufficient detail to outline the standard practice of the Germans. A few early *U* boats had duplicate bow hydroplanes—one set above water and one set "drowned." They were installed one above the other. The practice has been abandoned.

CONNING TOWER.

Size standardized for all types except *UC* type, which has its own standard—elliptical in shape with forward end stream-lined or strut shaped and after end squared off; length 10′–6″, and beam 4′–4″. Top or dome casting of C. T. is a steel casting or stamped plate $1\frac{1}{4}''$ to $1\frac{5}{16}''$ thick, riveted to C. T. plating of $1\frac{1}{4}''$ thickness by two rows of rivets, staggered, 4″ center to center. There are four breast hooks inside forward and three inside aft. No other stiffening inside or out, except two built up channels of four angles and a bracket plate—one of these stiffeners is just abaft the upper hatch. The other is 2′ forward of after end of C. T. There is a 16″ hole in C. T. roof for the forward periscope and an 18″ hole for the after periscope (special type 7″ diam.) The lower C. T. hatch has $23\frac{1}{2}''$ clear opening, hatch is spring operated or balanced and closed by means of the interrupted screw-locking ring; operated by wheel and spindle from top or bottom side. Upper hatch is $23\frac{1}{2}''$ clear opening and is similar except that the locking device is by wheels on either side and four dogs; also a separate locking wedge dog to get hatch down to locking position.

There are six eyeports 6″x3″, one on either bow, one amidships, port and starboard, and one on each quarter. The two on the bow are in recesses in dome casting of C. T. plating similar to the recesses we adopted in *R* and *S* classes, for running light installation. This complicated the C. T. dome casting or C. T. plating but a good job has been done.

VENTILATION *U 19*.

The system has been standardized and is generally similar in all classes. It is very elaborate compared with other services, (British, French, Italian and U. S.) and has many intricate leads, cross connections and fittings. Bulkheads and strength hull are pierced indiscriminately. As a ventilation system, pure and simple, it should be

very efficient. No compartment is overlooked and any number of leads are taken off the main lines, in some cases without any apparent rhyme or reason.

The system consists primarily of a supply line, from main air supply trunk in C. T. fairwater, running forward and aft on starboard side of boat; and an exhaust line running similarly from exhaust trunk (in C. T. fairwater) forward and aft on port side. These lines are cross connected either in engine room, control room or Aux. room, so that either fan can be operated on either system. An excellent plan of ventilation was borrowed from the British, who found it on *U 160*, and a pencil tracing was made; this is forwarded and gives all essential details of the piping system.

A sluice or gate valve is fitted to the vent pipe where it passes through a pressure Bhd. and this is operated from either side of Bhd., a very neat design.

The main induction has its inlet in C. T. fairwater and varies in size according to H. P. of engines. It leads down and aft, thence through I. H., after which it branches and leads out board to I. H., where its section changes from circular to rectangular, and it follows the inner hull down to about the height of the engine room floor where the pipe ends just abreast, but slightly abaft the forward end of either engine. Two valves are fitted on each of these three air lines (supply, exhaust and main induction); one a top-screw down mushroom type and a stop valve just above the I. H. Both valves on each trunk are operable from inside the boat.

Emergency air lines.—Three sets of lines—one forward, one aft and one in C. T. fairwater, fitted with butterfly cap nuts—two lines at each place (in each set), marked with a red cross label plate about 6″ square.

BLOWING TANKS.

The number and location of vent domes varies, but the principle in standard.

U 135—Two domes, aft—vent ballast tanks, 2, 3, 4, and 5.
Two domes, forward—vent ballast tanks, 6, 7, 8, and 9.
One dome, forward—vent ballast tank 10.

No. 1 ballast tank and bow ballast (buoyancy tank) has no domes. All the ten tank vents are controlled from control room, by shafting leading to valves at the domes. The middle body vent domes are usually twin valve installations, while at the ends there is but one valve. *U 135* has 5 vent domes controlled by four wheels in control room. *UB 149* has 3 domes controlled by three wheels in control room.

Sufficient plans were obtained to indicate the systems on various types. The long lines of shafting through many Bhds. is an objectionable feature, and although in many cases two systems of domes

are operated from the same shaft, the operation was reasonably easy. Central control is, of course, very desirable and speed of operation is essential; these requisites are obtained by this system, but the British telemotor-control is considered superior.

These ballast tanks are all connected up to the low-pressure turbo blowers to blow on the surface.

The turbo blowers furnish air at about 7 lbs. above atmospheric pressure and this is a standard installation.

TORPEDO INSTALLATION.

This varies in each class and in boats of the same class; torpedoes are stowed wherever suitable space is available. The torpedoes are hoisted on board by means of derricks, booms, davits etc. from tenders or from the beach, which is the usual practice.

Torpedo davit sockets etc. are installed in, but under superstructure alongside of loading hatches. No torpedo davits or cranes were seen and it is assumed they were beached during the war. On *UC's* the torpedoes could be floated into the internal tubes, or shoved in by hand by means of cradles or racks at fwd. end of tube. A number of deck torpedo installations of a design taken from a Russian engineer were noted on old *U* boats at Kiel. These consisted of cradles only (no torpedo tube) in which the torpedo rested, exposed to air and water. These were not successful and were abandoned.

The torpedo loading hatches are similar to U. S. N. practice.

Inside the boat the spare torpedoes are stowed abaft the tubes usually in strap cradles, the strap being secured to frames or beams at top and to frames at side. The lower tier of spares are stowed outboard in T. R. in wooden chock cradles. The straps are made of galvanized wire braided or interwoven. These wire slings or straps are about 3″ wide and there are either 2 or 3 of them for each torpedo. In most boats, the wire straps are served with marline but in some they are uncovered.

In after T. R. of *UB's* the stowage of a spare torpedo is difficult, and unless bunk or locker space is encroached upon the torpedo must be stowed on deck along the middle line. In after T. R. of *UC's*, conditions are much worse and any spare must be slung from loading rail (I beam) or stowed on deck in passage—to be crawled under, climbed over, or walked on to get into T. R. It is possible to stow a spare torpedo slung from the loading rail and leave torpedo in engine room and motor room compartments, but access fore and aft would be very difficult. It appears doubtful if any spares were carried on *UC's*.

In *U 117–126* (mine laying cruisers), the torpedoes could be stowed abaft the tubes both outboard and on deck of T. R., also under the deck of T. R. (forward).

In *Deutschland* class (*U 151–158*) torpedoes were carried in compartments below the torpedo room.

Torpedo tubes are of composition—doors of composition. breech of interrupted screw thread type—interlocking gear fitted. Tubes have top and bottom guide slots.

Two impulse tanks are installed for each tube—these tanks are connected to each other. They are located in various positions but usually outboard abaft the tubes; sometimes two on a side abaft and the others (where there are four tubes, there are eight tanks) alongside the tubes; again there may be some under the tubes. The latest practice in cruisers appears to be to locate one half of the tanks inside abaft the tubes and the other half outside strength hull under the superstructure just abaft the tubes, with connection through the inner hull. When this is done the outside tanks are protected by heavy plating; in fact, external containing tanks are built to receive the impulse tanks. These tanks are fitted with a heavy manhole plate. These tanks are not impulse tanks, but torpedo compensating tanks on most boats.

The size of tanks varies to suit the location but there is a standard size which is 6′ long by 16″ outside diam.; capacity, 200 liters (taken from B. P.) or 7 cubic feet—therefore 14 cubic feet capacity for each tube.

AMMUNITION, STOWAGE AND HANDLING.

Where ammunition rooms are fitted in inner hull, ordinary ship practice is followed and no unusual installations were noted. Ready service magazines or stowage is fitted in all classes in the superstructure near the guns they are to serve. These vary from an ordinary superstructure deck locker with an ordinary wood rack, to a more elaborate locker with a separate wood rack for each shell, and two hatches to the locker. The upper hatch is the ordinary sheet metal superstructure hatch topped with wood battens and beneath this a steel (sheet metal) hatch, fitted with screw dogs that require a wrench spanner or screw driver to open. It is spray tight but not water tight. No rubber gasket is fitted. A drain pipe leads out of bottom of locker. Individual sheet stowage was noted in some of the ready magazines to take the so called W. T. "beer bottle" shell container with the patent opener. One of these was seen at Queenstown and a sketch was to be made and sent to the Bureau of Ordnance. None was seen at Harwich or Kiel.

The superstructure stowage was most elaborate in division and extent, especially in *U 117–126* class, the *Deutchland* class and the cruiser classes. It varied in each class and in boats of the same class, the idea being to utilize all the available space in the vicinity of the guns.

In *UC* class and in some *UB's* the ammunition was passed up by hand through the conning tower to the bridge; thence forward to guns by means of a tube of proper diameter, which led forward and downward through bridge screen to about 4′ above superstructure deck. This tube was capped at forward lower end with a hinged section of tube which swings downward and aft permitting the shell to be released and carried to the gun. When closed, this cap is secured by means of a strap and handle to the supply tube.

GENERAL NOTES.

a. Frames are numbered from aft forward.

b. Frames of inner hull are numbered independently from aft forward. Frames of outer hull numbered independently from aft forward, so there are two systems of framing and two sets of numbers.

c. Superstructure plating is galvanized, as are also the superstructure frames and beams. The plating varies from 5 lbs. to 10 lbs., depending on location. This also varies in different boats.

d. Three sets of draft figures are secured to outer hull, one set forward, one set aft and one set amidships. These are spaced 10 c. m. apart (a good idea).

e. The height of hinged wireless masts varies from 28′–53′ from the superstructure deck, on different types and in boats of same type. Average height about 35 feet.

f. No battery lining was noted in any boats. Battery tanks are given the ordinary red lead coats and over this is a bituminous solution of graphite paint—form of acid resisting paint. Either they have little or no acid spilled or they flush the tanks with some anti-acid solution, as there was evidence of the acid proof paint being rubbed off in various places. There was no evidence of acid spilling. Informed at Kiel that they flush out tanks with soda.

g. Various kinds of deck covering paint were noted on top of superstructure, including bituminous solution and sand, following similar U. S. N. efforts on destroyers and submarines.

h. Only one anchor fitted except on *U 71–80*. This is a patent deck anchor fitted in a housing hawse pipe on starboard bow. The shanks house in a tube casting and the crown and flukes project slightly beyond the ship's side. The hull is recessed to house all but a few inches of crown and flukes. A guard like a destroyer propeller guard is fitted around the anchor. The weight of the anchor on *U 124*, 1500 ton boat (?), is 700 kg. (1520 lbs.) and it is possible that the weights of anchor are about 120 lbs. per 100 tons of boat. *U 71–80* has no deck anchor but one mushroom anchor in-

stead—no other boats of recent type have a mushroom anchor. The mushroom anchor of old *UC* boats weighs about 660 lbs.

i. No armour, as such, is fitted on any of the boats. The top strake of the inner hull is 1″ thick on *U 139–142* and ¾″ on *U 135*, but only ½ to ⅝″ on *U* boats and $\frac{7}{16}$″ to ½″ on *UB* and *UC* boats. The C. T. of all late types is very heavy and plating is thick, 1¼″ to $1\frac{5}{16}$″ (50 to 52½ lbs.) Where C. T. dome casting laps the C. T. plating, a thickness of 2½″ to 2⅝″ exists, but this is only a lap; however it is probable from this that reports of "armour" arose. This plating may be S. T. S. or bullet proof steel—no means of ascertaining this was available. Told at Kiel that C. T. is made of nickel steel.

j. General practice to fit fore and aft wood batten decks on superstructure following the superstructure contour, including gun working circles. These battens are about ½″ to ¾″ thick, 4″ wide, with ½″ space battens.

k. Hand operating sounding machines are usually fitted in each type, generally located in forward T. R. in small types or on 3rd deck, between T. C. and B. C. on largest types. This machine is similar to that used on surface craft so far as principles of design are concerned, but it has a special type of lead with a gauge in it operated through a tube casting (gland tube) through hull fitted with valves and stuffing box, to remove and insert the lead and for W. T. purposes. Sample of lead obtained. The gauge to check length of sounding wire out reads from 0 to 190 metres in *U 141*. This gauge is attached to top of machine; wire is galvanized. Located in *U 141* in crew compartment (3rd deck) frames, 70 to 74.

l. Recognition signal tubes for firing bombs from inside the boat are of recent development and only found on very few boats. The design is quite like the Bureau design and operated on same principles—usually located just over after T. R.

m. All hydroplanes on latest boats are of "drowned" type located well down on the hull forward and aft. They are fixed planes and protected forward by stream-line guards similar to propeller guards on destroyers. Aft they have a half-guard on after side and a wire rope guard forward or else a complete stream-line guard, similar to forward installation. These guards cut down submerged and surface speed very materially—British state about one knot for similar installation on British boats. *Exceptions.*—Cruisers *139–142* have above water forward hydroplanes folding into N. W. T. hull. They fold forward and inward overlapping each other in stowed position. Guards fitted above and below planes. The installation projects slightly beyond hull lines on either side when folded in.

n. Wireless masts. Two cast steel or cast iron pipe masts—hinged type—forward one hinge aft and after one hinges forward in gutters in superstructure. Some are fitted with steps and a lookout station aloft—usually forward mast. Thickness of metal at base, $\frac{3}{8}''$. These masts are fitted at keel to a quadrant over which reeves a chain fall which raises and lowers them—motion operated from inside the boat. Each section of mast is swaged or welded together, each section being reduced in diameter from deck up. Evidence of use of acetylene welding in some—electric welding in others. They vary in length from 28′ to 54′. There is also a telescopic flagpole mast which houses in C. T. sheers—usually a three section mast; some are all metal sections and some have a wooden topmast.

Practically all boats have clearing lines which are insulated and used for wireless. These lines reeve from forward to bridge and aft through a sheave and back to bridge where they are fitted with turnbuckles and secured. Some are secured aft—all fitted with turnbuckles.

o. On a number of latest boats were noted an assortment of various sizes of tapered wooden plugs to be used as shot hole leak stoppers.

p. Mattresses stuffed with coarse horse hair.

q. Bunks for crew of hinged type—pipe rails bunks—wire springs with pipe bracket at head end, fitted with wire springs. Bunks are usually 6′ long x 23′ wide.

r. Aeroplane recognition signal on forward superstructure deck—sheet metal ring hinged at centre—can be folded over double when not wanted. Diameter 6′–6″ width of sheet metal, ring 14″. When open, the rings show white throughout the circle, i. e. 14″ white painted circle. When closed or folded the color is same as deck.

s. Little effort was made to camouflage the submarines, although a few showed signs of having tried various designs—apparently up to whims of C. O. Hulls generally painted light slate color—upper decks or "top side" black asphaltum paint. A small number of grotesque efforts a la Chinese junk style of eyes on the bow etc. were noted.

t. Air bottles,—standard in all boats, steel flasks, 16″ diameter x 10′ long, by $\frac{1}{2}''$ thick, containing about 14 cubic feet each. (A print was seen showing contents at 200 litres, or 7 cubic feet. This undoubtedly referred to impulse tanks). The H. P. air line bottle connections are $\frac{5}{8}''$ out diameter in *UB* and *UC*, and $\frac{3}{4}''$ out diameter in *U 124* and *U 164*. Junction of lines from 2 bottles is made inside inner hull and the lines are then $1\frac{1}{2}''$ out diameter. Located generally in the superstructure as far as practicable and the external piping is copper; internal, steel-tinned on both sides. Exception, *U 164*, which are all steel, with a rust-proof paint inside and out. Lines and tanks coated with bitumastic.

SPECIAL NOTES.

(*a*) Free flooding bow buoyancy tank in superstructure, one or two vents operable from T. R. or from C. R. or both.

(*b*) No housing guns are fitted. Practice abandoned two years ago.

(*c*) Net cutters—bow is knife edge or saw tooth, slanting up and aft at about 30° from stem head; supported by steel bracket stays of "saw-horse" design. The saw edges are hardened steel insert teeth or knives (10 or 12 of them) about $\frac{3}{4}''$ wide, $1''$ to $1\frac{1}{2}''$ deep and $10''$ long; set between narrow steel holding plates.

(*d*) Vertical rudders, on some cruisers are fitted above the hull to assist in maneuvering submerged. They are like our G. 4 installation. The upper section of rudder is on same shaft as the lower section. This practice is not standard even on cruisers.

(*e*) The 19.″7 torpedo is reported to have 360 to 440 lbs. of explosive; the 17.″7 carries 300 to 350 lbs.

(*f*) It is understood the heavy folding W. T. masts are seldom used and that in any kind of a seaway it is dangerous to hoist the masts.

(*g*) Torpedo adjustments can be made while torpedo is in the tube.

SPECIAL NOTES (LIEUT. COMDR. BOWER, R. N.)

Notes obtained from Lt. Comdr. Bower, R. N., who interviewed various German officers, particularly Kapt.-Lieut. Steinbruck, a "Fritz" C. O. of the more decent sort who had commanded a *UC*, a *UB* and one other boat during the war. He wore the "Pour la Merite" order having sunk over 200,000 tons. He was our "Sub" guide at Kiel and Bremen. We also had a Hun Torpedo Officer on board who had lived 14 years in Canada and only been in Germany during the war (Com. Elmenhorst).

(*1*) Germans tried broadside torpedo tubes but could not fire them successfully, as torpedo tails were damaged. They tried various impulse speeds but experiments were unsuccessful and they gave up the broadside tube idea. They stuck to their 14 m. per sec. impulse velocity.

(*2*) *UB* boat battery capacity 6000 amp: hours. *U* boat battery capacity 10000 amp: hours.

(*3*) *U 140* class has only $3''$ G. M. On trials *U 144* took a list of 40° owing to a port tank flooding and opposite tank not flooding. This class are good divers—better under water than on the surface. Clipper bow to assist boats to get through nets. This bow causes the boat to "bang" her nose into the sea. There are bunks for 47 men.

(*4*) American mines in North Sea were seen to explode in rows after one is set off.

(*5*) British submarine torpedoes were known to have hit a number of "Fritz's" and failed to explode.

(*6*) Armour (1″) on top strake of *U 140* class was contemplated (possibly installed but certainly removed) but abandoned on account of stability.

(*7*) The "Ford" car method of construction of submarines is in full swing, particularly at Hamburg where they do them in bunches of 5 or 7 or more. For example, 7 stems and 7 sterns are ready to be installed alongside the building ways. The 7 end sections are also ready to fit on to the hull, etc., etc.

(*8*) Germans appear to know nothing of angle gyro torpedo firing. They think British spread due to spread of tubes.

(*9*) Complement of *U 120:*

5 officers and 59 men.

At Kiel, Germany, Dec. 14, 1918, joined Sub. Inspection Board at 8:45 a. m. and inspected 36 submarines at Kiel Yard—11 *U* boats:—1 *U 135* class, 1 *U 140* class, 11 *UB's*, 9 *UC's*, 3 Baby Russians; *U 140* in floating dry dock, 2000 tons, (*U 135* class 1600 tons). *Hull plating*—top and bottom strake of I. H., 25 m. m.; rest 20 m. m. 2 docking keels. Rather fine underneath, i. e., slightly pegtop in shape. Stability condition of *U 140* reported very bad, very little G. M. At any rate she is undergoing extensive alterations at present. Her side plating (O. H.) had been cut by acetylene torch for access and alterations. Her tanks were reported leaky but the necessity of cutting side tanks to repair these was not apparent. It was apparent that very large wooden beading or filling pieces were being fitted along the superstructure at both outboard edges thereof. These pieces were about 16″ to 18″ in diameter and shaped to suit the junction of O. H. and superstructure. They are fitted about 24″ above the waterline and are being installed to increase the buoyancy and increase the stability of the boat (so we were informed by German officer guide). I asked about removal of air flasks from superstructure and was informed that this had been done and the air bottles stowed inside I. H. or elsewhere lower down in the boat.

This boat had been in commission and has made cruises, but her behaviour was unsatisfactory. Details could not be obtained. The fact was evident that extensive alterations were underway. By the same token, no evidence of similar alterations was noted in similar cruisers at Germania shipyard, where three were overboard and about 90 to 95 per cent completed, and believe more were under construction in various state of completion ranging from 60 to 85 per cent.

No information at Harwich on *U 139* or *U 141* indicated stability trouble with this class but this is of little import as no information of this kind was obtained on any of the boats.

It is understood that stability troubles have occurred on *U 117–U 126* class—this is readily believed, especially if full allowance of ammunition were carried in her superstructure deck ammunition lockers. She had 2 5.″9 guns and a large allowance of ammunition, much of which is stowed in deck lockers in superstructure.

This class is reported as handling very poorly, which is also readily believable from her shape and overall characteristics.

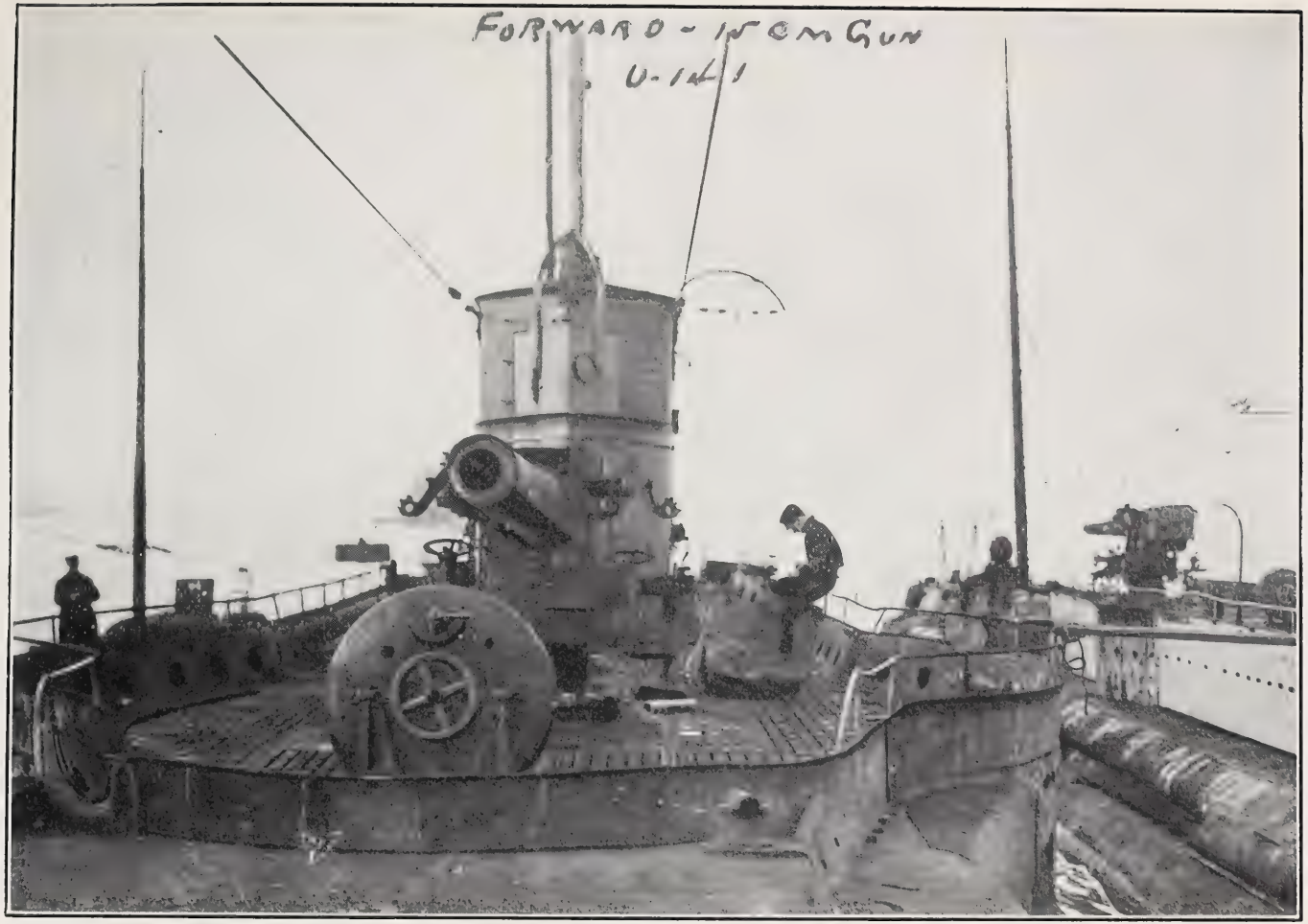
Her speed is very low—12/9, with some doubt as to the 9 k. submerged.

GENERAL COMMENTS.

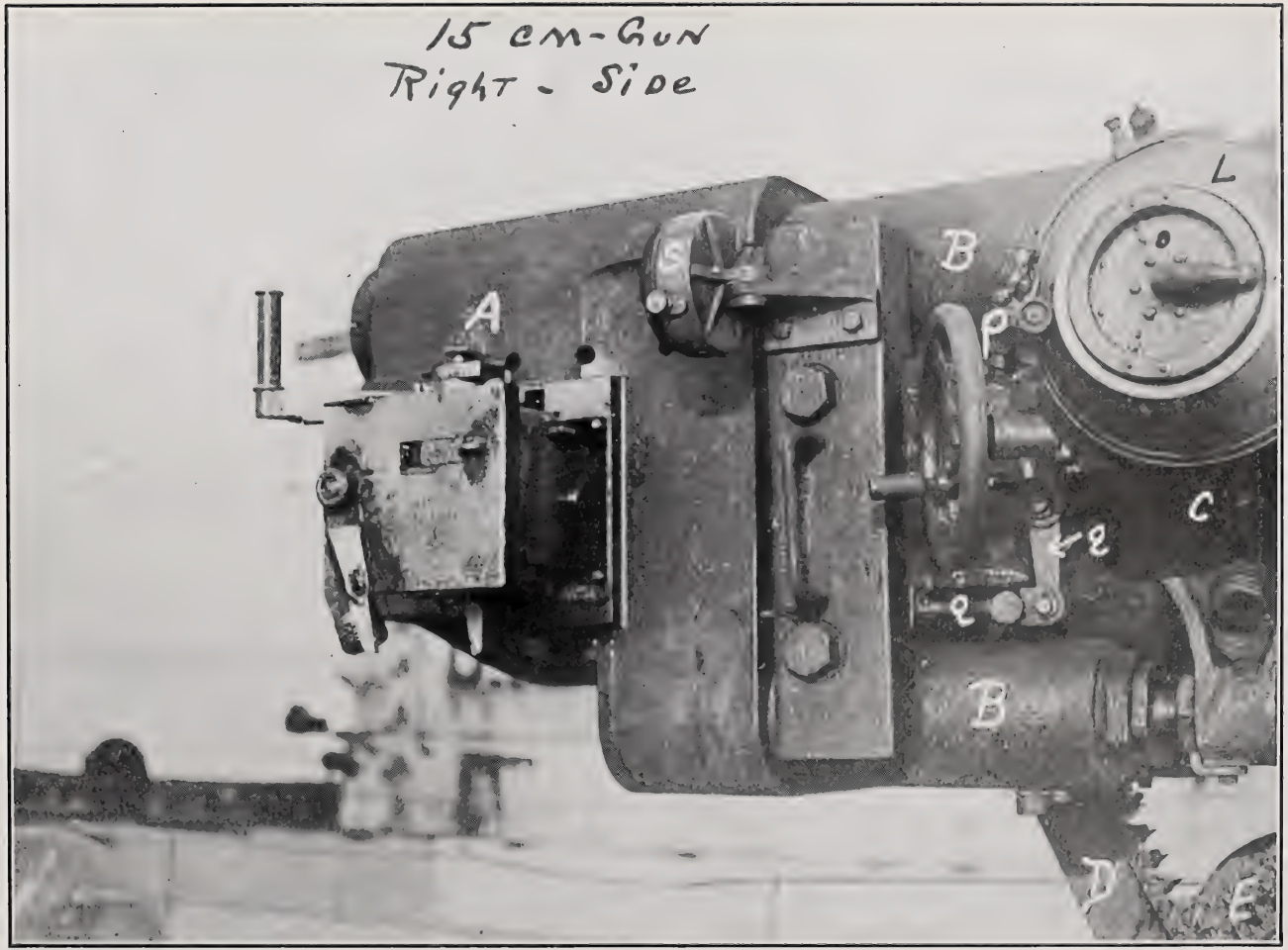
As a result of an examination of the *U 164*, *U 124*, *UB 149* and *UC 105* and a hurried inspection of numerous others, the following features present themselves:—

1. Great attention paid to lubrication.
   - (*a*) Grease cups on all shafting universal joints, regardless of whether they are inside the hull, outside the hull, or inside pressure tanks.
   - (*b*) Numerous oil holes in housings.
   - (*c*) Gears running in oil baths.
   - (*d*) Stern tube glands oil lubricated.
2. Apparent disregard for weights.
   - (*a*) Hand wheels on valves seem heavier than necessary.
   - (*b*) Large quantity of pig ballast stowed in different places in the boat.
   - (*c*) Large turbo-blower installation.
   - (*d*) Ward-Leonard system of periscope train on standard periscope.
   - (*e*) Heavy casting around base of standard periscope.
   - (*f*) Conning tower periscope housing carried all the way to the bottom of the ship.
   - (*g*) More pumps and motors.
3. Apparent disregard for projections on outer hull tending to reduce submerged speed.
   - (*a*) Numerous deck cleats.
4. Irregularity of frame spacing.
   - (*a*) This would indicate that frame space was varied to suit installation of machinery and fittings.
5. Apparent disregard for piercing watertight bulkheads, pressure tanks, and hull.

6. Finish of workmanship. Stowage of spares.
   (*a*) Gaskets all cut and tagged.
   (*b*) Very best material used in all cases. Periscopes especially showed fine workmanship. Torpedo parts were the only cases of any rough machining.
7. Apparent lack of facilities for repairs at sea.
   (*a*) No machine tools. Parts inaccessible.
   (*b*) All machinery is assembled to run for a certain definite period and then overhauled at a base.
   (*c*) Very few large spares are carried on board; the battery especially being very inaccessible.
8. Elaborateness of the fitting up of the officers' quarters.
9. All boats fitted with submerged sounding machines.
10. Water meters on flooding lines.
11. Sight boxes on pump manifolds.

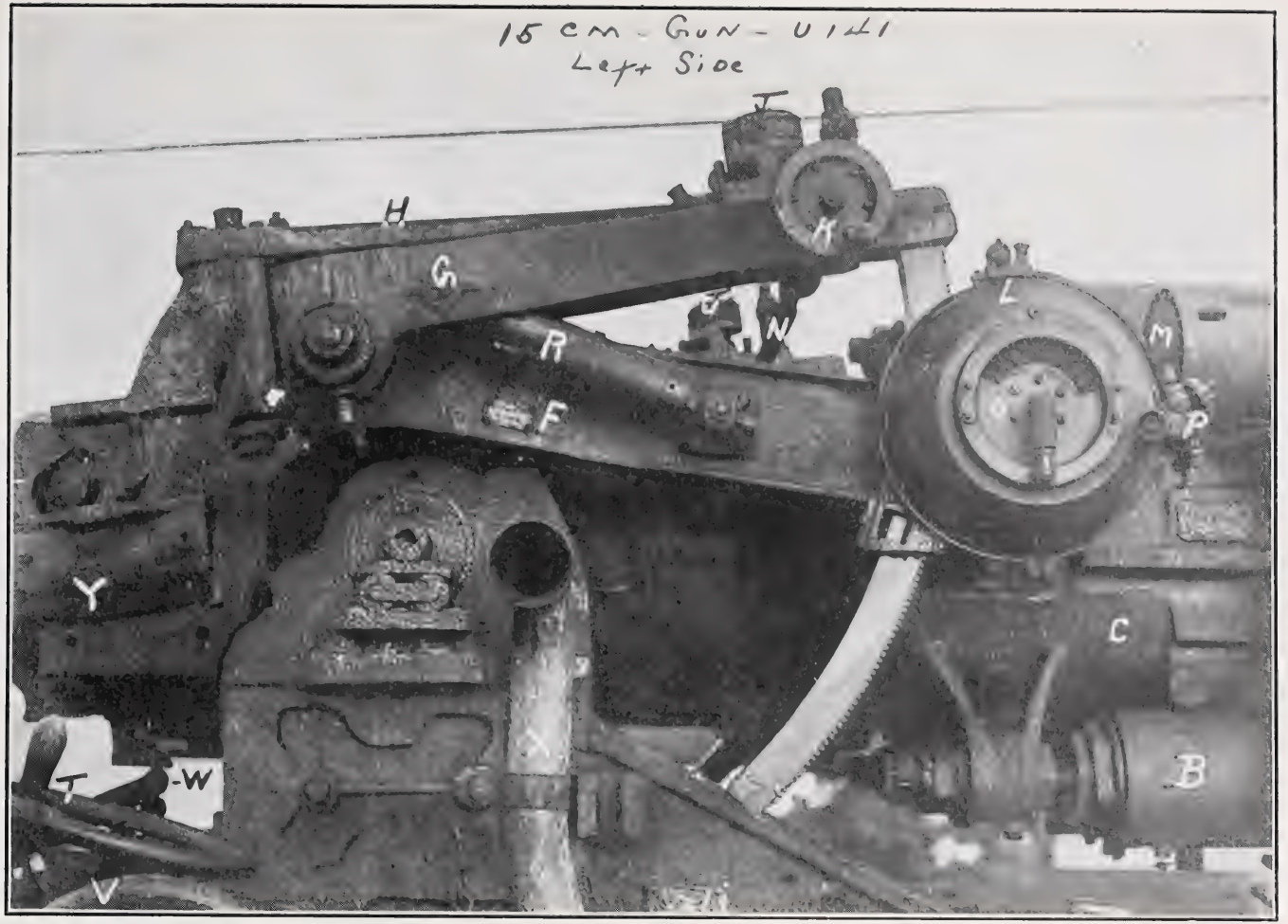


FORWARD 15 CM. GUN, GERMAN SUBMARINE *U-141*.



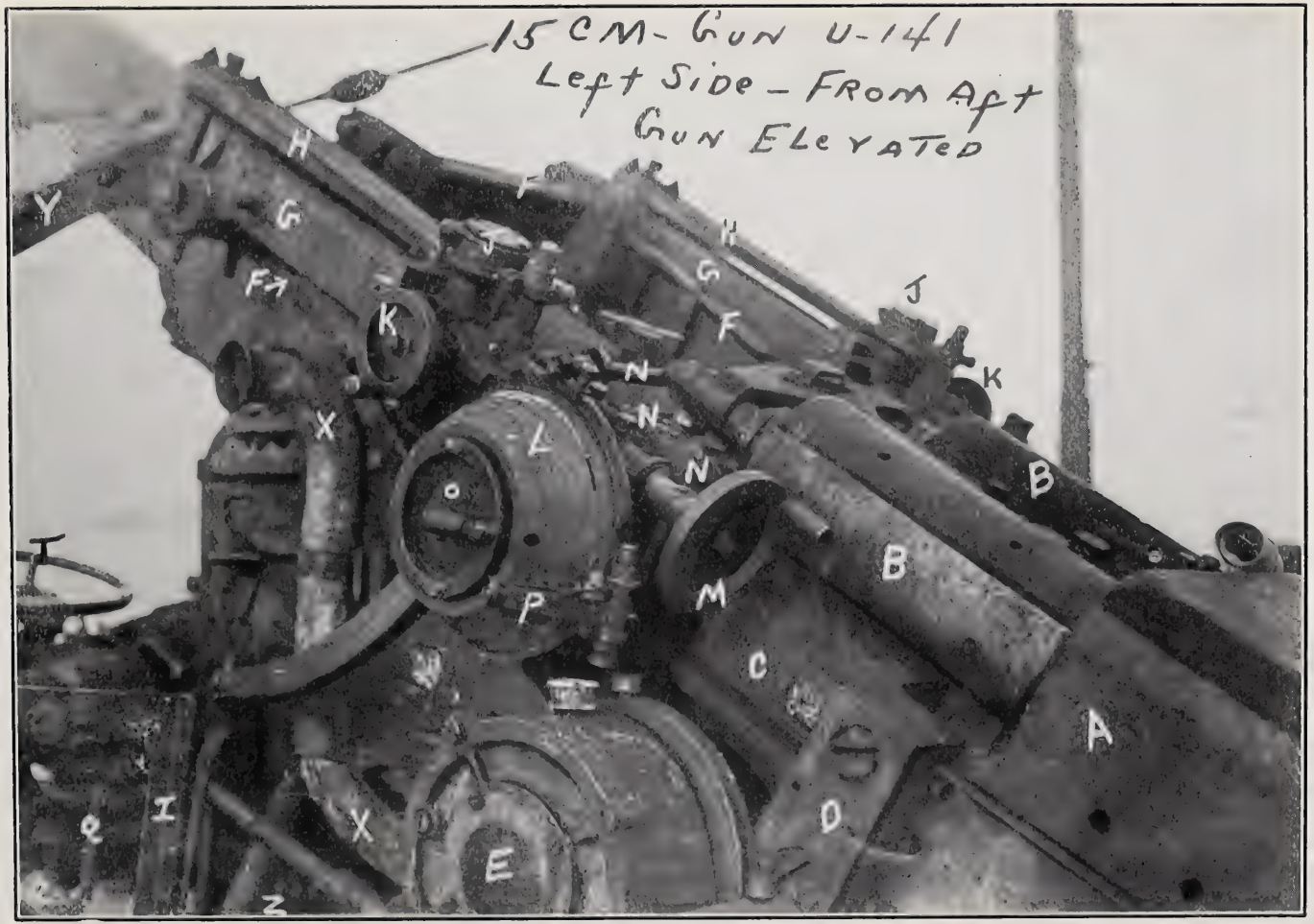
15 CM. GUN ON GERMAN SUBMARINE *U-141*, RIGHT SIDE.

(See page 25 for legend.)



15 CM. GUN (LEFT SIDE), GERMAN SUBMARINE *U-141*

(See page 25 for legend.)



15 CM. GUN, GERMAN SUBMARINE *U-141*, LEFT SIDE FROM AFT, GUN ELEVATED.

(See page 25 for legend.)

ORDNANCE.

GERMAN SUBMARINES—15 CM. GUN—PHOTOGRAPHS.

Source: Report of Admiral S. S. Robison, U. S. Navy.

30 December 1918.

(11222A)

In these photographs of the 15 cm. gun found on German submarines, the following lettering has been used:—

A—Breach jacket.
B—Recoil cylinders.
C—Slide.
D—Elevating arc.
E—Friction disc casing.
F—Sight bracket foundation bar.
G—Elevating arm bracket (sight mechanism).
H—Deflection arm.
I—Trainer's arm.
J—Deflection drum.
K—Deflection drum operating wheel.
L—Range drum.
M—Range drum operating wheel.
N—Cross shafts between deflection and range drum gears.
O—Center disc range drum.
P—Sliding pointer on range drum.
Q—Firing mechanism (levers and rods left side).
R—Sight mechanism (lost motion absorber).
T—Training hand wheels.
V—Elevating hand wheels.
W—Depression-toe.
X—Voice tube.
Y—Telescope hole.
Z—Training rack.

GERMAN SUBMARINES—RANGE FINDERS.

Source: Commander W. R. Van Auken, U. S. Navy.

(Continuation of Report of Board of Inspection of Surrendered German Submarines.)

30 December 1918.

(11222A)

DESCRIPTION OF RANGE FINDERS.

Range finders of the housing type were mounted on the *U-135*, *U-139* and *U-141*. These were of 3-meter base and stereoscopic de-

sign. The range finder and mount of *U-135* was in good condition and operative. In the *U-141* the range finder was housed all the time.

General Description of Range Finder as Seen on U–135.

On the *U-135* the range finder was found in housed position. Its mounting is on after side of bridge and protected by a tower of 1.2-inch plate.

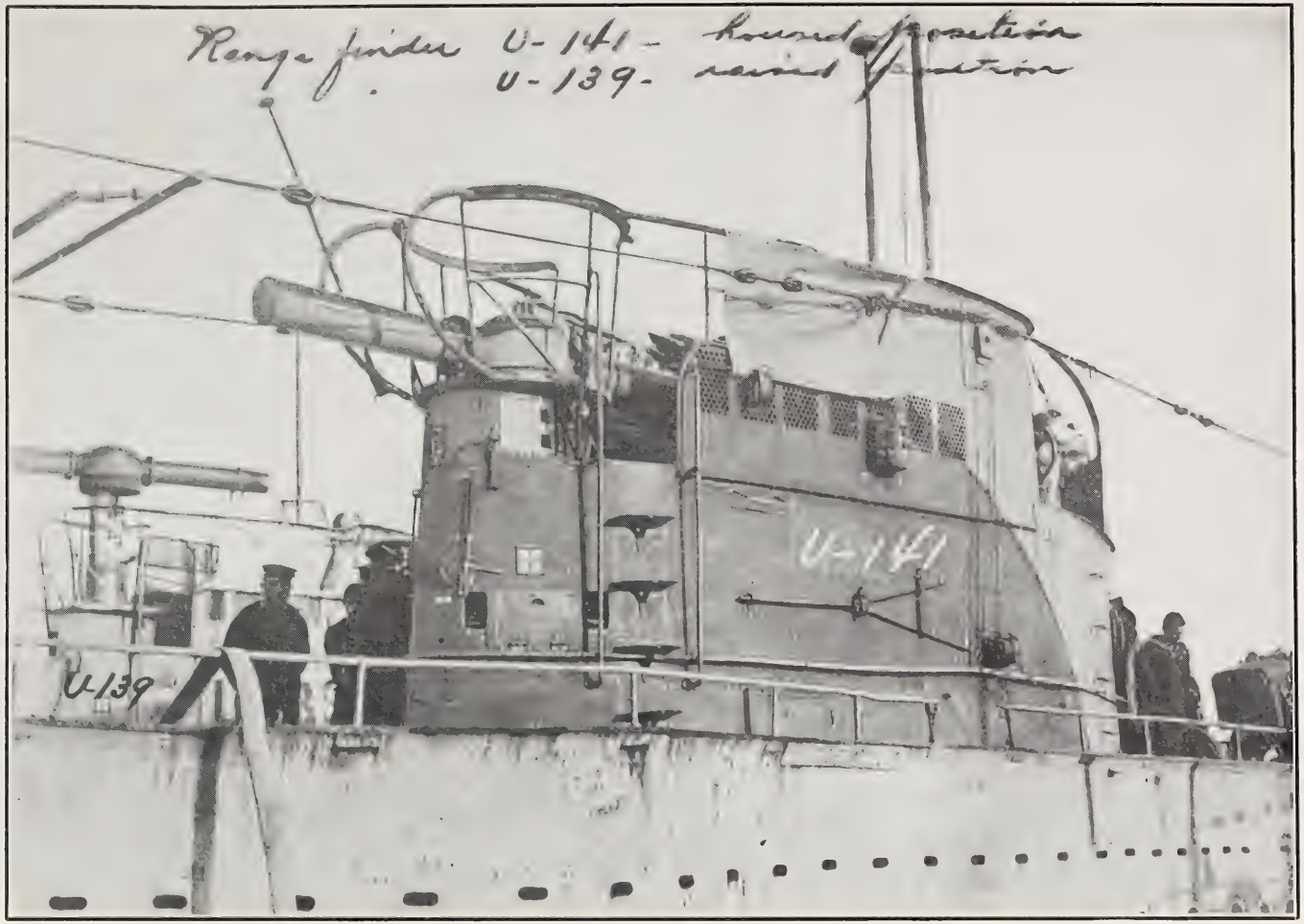
Down in the forward part of the engine room are located the supply, exhaust, and relief valves of the air line for hoisting the range finder tube. Air is turned on to the cylinder and under a piston which pushes tube up. Secured to the tube is a casting, which supports the range finder and its cover. The tube has a train of about 4.5 feet and the range finder, when in position, is about 5 feet above deck of bridge. Sketches show the pedestal, range finder cover, bearings and arms used in elevating and training the range finder by hand, when in the housed position; rubber gaskets inside of the dome cover resting on the base keep the tower and range finder watertight. In addition, cover plates over the objectives make the opening in the cover casting watertight. The range finder can be trained 360 degrees and elevated or depressed about 20 degrees. The range finder can be lowered or hoisted within 30 seconds.

The range finder itself is a Zeiss 3-meter base, stereoscopic type about 6 inches in diameter. Two periscopic legs are secured to ordinary eye piece positions which reflect the rays of light through 90 degrees down to eye-piece of periscope. In the tube from the range finder down to the dial is the mechanical gearing connecting the range knob to prism inside the range finder itself. This feature of the design is purely for the *submarine* type of 3-meter range finder and it would be necessary even if it were of the coincidence type, in order to provide means of housing the covering of the range finder without interfering with its operations.

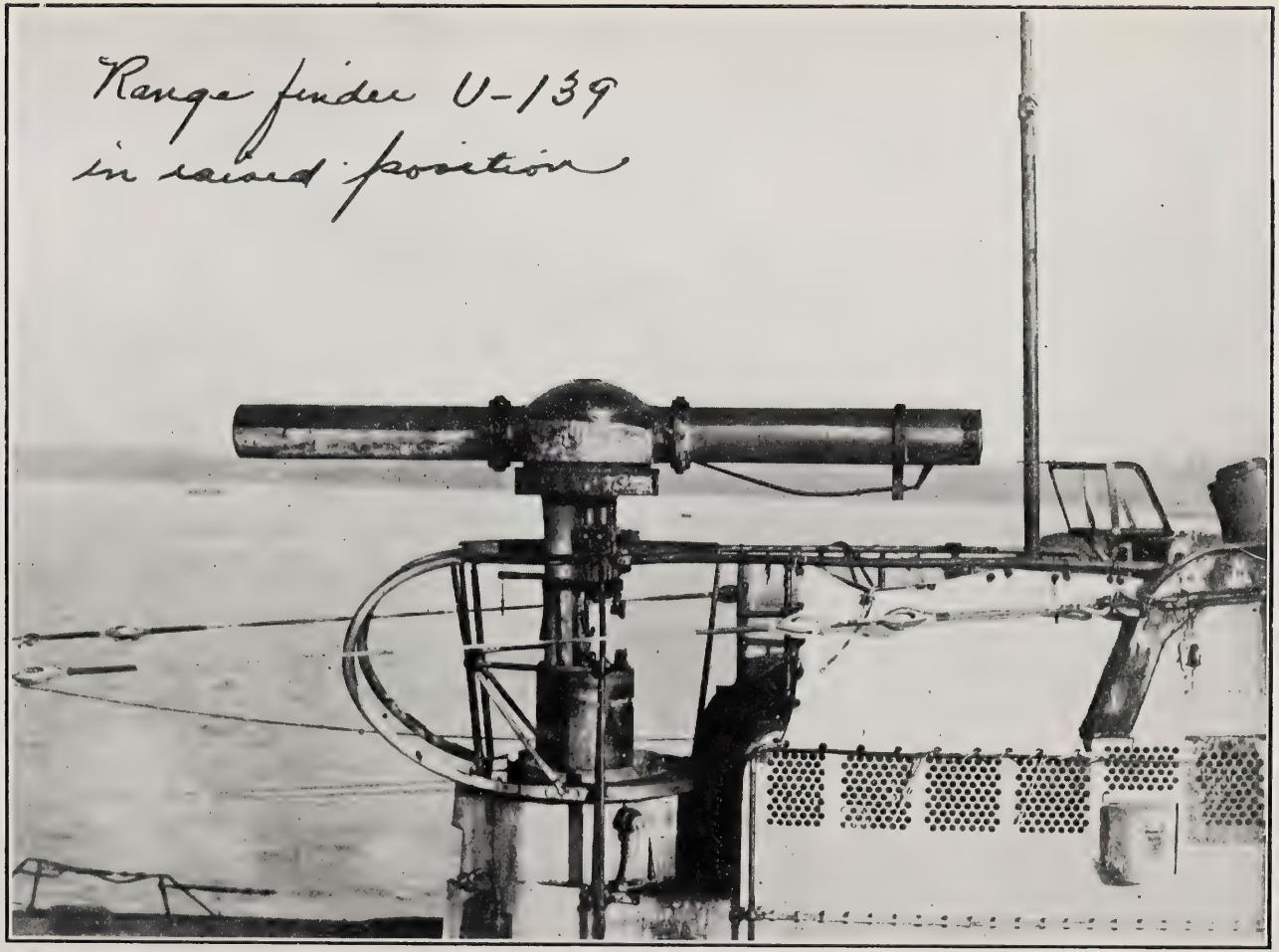
The *adjustment* of the range finder can be made by turning the adjusting knob, which closes the shutter over the objectives, in a similar manner to the inside adjustment in the Bausch and Lomb range finder. When the shutters are closed and the lamps are turned down inside the range finder, there appears a vertical line and the small triangles of the stereoscopic range finder.

Observations were made under very poor atmospheric conditions, within one hour of sunset on an aeroplane. The light transmission was notably good and the range finder appeared to be quite efficient under adverse conditions.

The range finder dial is graduated to 17,000 yards. From 3,000 to 8,000 yards it is graduated every 50 yards and from 8,000 to 17,000 is graduated every 100 yards. The knob of the range dial used for the



RANGE FINDERS ON GERMAN SUBMARINES *U-139* AND *U-141*.



GERMAN SUBMARINE *U-139*, RANGE FINDER IN RAISED POSITION.

inside adjustment also gives the zero position of the range dial. The switches below the range dial are for inside and outside illumination.

In looking through the eyepieces there appear five triangles and below these triangles a series of fine divisions. These are used in getting stereoscopic readings.

This range finder was probably used for getting ranges of convoys for the purpose of making approach and also getting the range of merchant vessels when under gunfire.

There was no opportunity of breaking down the range finder or seeing any sketches pertaining thereto. The optical design is not known. It is presumed, however, that the design of this 3-meter range finder is similar to the 1-meter stereoscopic range finder used in the U. S. Navy 10 years ago, and also quite similar to the 3-meter range finder recently designed by the Bausch & Lomb Co., New York.

1–1½ METER BASE RANGE FINDER.

In the *U 153* down in the crew's compartment was found the range finder of about 1½ meter base. This range finder was loaned for the use of the U. S. Navy pending peace negotiations and was placed aboard the *Harvard*.

It appeared to be a range finder of stereoscopic design weighing about 200 lbs. of a portable type. The stand for this range finder was mounted forward of the binnacle, just forward of the bridge. When the range finder was not in use, it was stowed on the bulkhead in the crew's compartment of the *U-153*.

GERMAN SUBMARINES—TORPEDO CONTROL.

Source: Lieutenant Commander H. L. Abbott, U. S. Navy.

30 December 1918.

(11222A)

The main torpedo control station of all German submarines inspected appears to be in the conning tower. Communication between the conning tower and torpedo tubes is effected by one voice tube for each torpedo room and one torpedo order telegraph for each torpedo tube. The firing signal for each tube is given or the tube is actually fired, or possibly both, by an electric circuit for each tube. Each of these circuits is operated by an individual push button in the conning tower.

Only one instrument corresponding to the British Nasemith approach instrument has been found. A tabulated director board was found, but no other equipment.

The periscope azimuth circle is graduated on both edges of the bevelled surface. The lower edge of the bevelled surface extends to

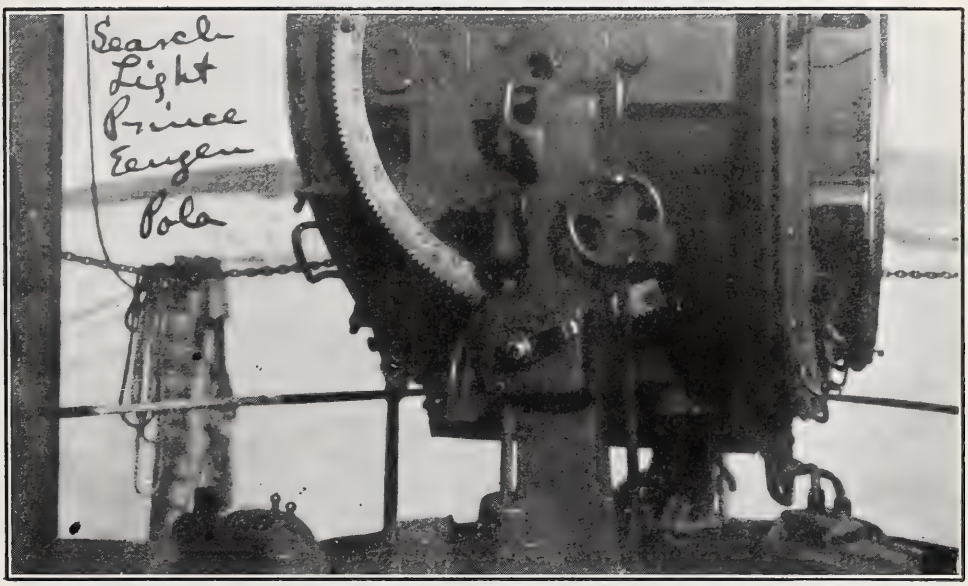
the periscope tube. A vertical line is scribed on the periscope tube above the eyepiece. The line serves as a pointer for reading the periscope angle of the azimuth circle regardless of whether the periscope is housed or hoisted. Above the fixed azimuth circle is a circle which can be rotated. This circle has a pointer on its lower edge. This pointer reaches down to the upper graduation on the fixed azimuth circle. The movable circle is graduated towards its upper edge from 0° to 60° each way. A pointer slides in the movable circle. The upper end of this pointer points to the graduations near the upper edge of the movable circle. The lower end points to the graduations at the upper edge of the fixed circle. For torpedo firing this pointer is set at the graduation on the movable circle corresponding to the director angle as given by a table of director angles, kept at hand in the conning tower. The pointer of the movable circle is set at the graduation on the fixed azimuth circle, corresponding to the torpedo gyro angle used. When the vertical index line scribed on the periscope is brought to the graduation on the fixed circle indicated by the pointer sliding on the movable circle, the periscope is at the correct angle for firing.

Each torpedo order telegraph indicator and transmitter consists of a dial marked in torpedo orders and replies, with two pointers, one operated mechanically at the indicator by a turning knob, the other operated electrically from the station at the other end of the telegraph. The order or reply indicated at the transmitting station by the mechanically operated pointer is indicated at the receiving station by the electrically operated pointer. Except for details in the mounting the indicators and transmitters in the conning tower and at the tubes are the same.

For calling from the conning tower to the torpedo room and vice versa, each torpedo room voice tube is paralleled by a whistle line. These whistlers are operated by blowing into the whistle line from either end.

For night firing a small portable director is mounted on a fixed azimuth circle on the bridge. This director consists of an arm pivoted in the azimuth circle to represent the torpedo course, with a sliding sight vane to be set at the graduation on the arm corresponding to the torpedo speed and a second arm pivoted in the torpedo course and speed arm with a small track angle azimuth circle at the pivot and a sliding sight vane to be set at the graduation on this arm corresponding to the target speed. There is no line of sight arm in the director. The night director station is connected to the conning tower by voice tube.

In many boats there is an emergency periscope in the central. This periscope has not the same azimuth scale arrangement as described above for the conning tower periscopes. There is also a



SEARCHLIGHT ON AUSTRIAN BATTLESHIP *PRINCE EUGEN.*



AMMUNITION BARGE, 12″ CARTRIDGE CASES, 6″ SHELL, AUSTRIAN BATTLESHIP *PRINCE EUGEN.*



FORWARD TURRET OF AUSTRIAN BATTLESHIP *PRINCE EUGEN.*

voice tube from the central to each torpedo room. There are, however, no torpedo order telegraphs from the central to the tube.

AUSTRO-HUNGARIAN SHIPS AT POLA—INSPECTION.

Source: Commander W. R. Van Auken, U. S. N., and Commander H. L. Pence, U. S. N.

29 January 1919.

(11351.)

TURRETS.

The *Prinz Eugen* and *Tegetthof*, the remaining dreadnaughts in the Austro-Hungarian Navy, present the only turrets of interest to our service. On each of these ships there are four 3-gun turrets, 30.5 cm. 45 caliber guns, electrically controlled and operated. There is a range finding tower and turret officer's station in the rear of the turret. The 9 ft. Barr and Stroud range finder appears to be the standard instrument used on most Austro-Hungarian dreadnaughts. There are openings in the front of the tower for the needs of the range finder and also for the turret officer, in order that a good view may be obtained of what is going on. As a consequence of these openings, the range finders have an excellent arc of train, possibly 6 degrees independent of the turret train. This space for the turret officer is open to the turret space but is elevated considerably above it. The turret officer's station is comfortable and instruments are well placed. All personnel have seats and communications are well placed with regard to them. The arc of train indicator for the two turrets of a group is not unlike our own. Bearing is received by an indicator in the turret officer's booth and at the trainer station at the same time. Bearing is provided to the nearest three minutes of arc by means of a vernier dial alongside the main dial.

In addition to one Barr and Stroud range finder, with 6° independent arc of train, there are:—one periscope for turret officer, one bearing, salvo and action signal receiver (either F. T. or A. T.), one turret bearing indicator to show train of own and adjacent turret, two range and deflection visuals—one to receiver from either station, second a transmitter to own guns, one voice tube to trainer, telephone to adjacent turret, telephone to gunnery officer, telephone to dynamo room and voice tube to adjacent turret. Small observation window is fitted in the forward part on the forward face of the range finder hood.

In the turret proper there are four directing stations. Guns may be fired together or independently. The main training station is between the center and left guns; pointer stations are outboard of right and left gun. There appear to be also pointer stations inboard of the right and left guns. Telescopes are used by pointers, no director system being fitted. Deflection scales permit of using large

deflection; 100 being zero point, scale being graduated from 40 to 150. The pointer elevating the gun looks through a Zeiss periscope sight, which for the left and right guns protrudes through a hole in the side of the turret, somewhat similar to that in the *Michigan* turret design. The sight mount is directly connected to the trunnion with such a short lead that there is little chance of lost motion. The periscope sights in the turrets are in most excellent condition, absolutely clear and free from all moisture. The condition of these periscopes is especially noteworthy.

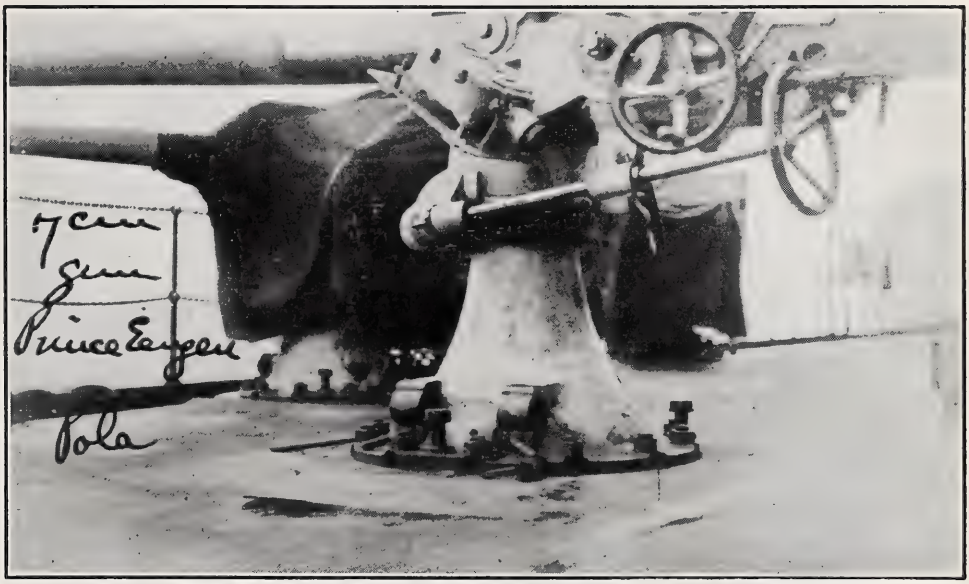
TRAINING OF TURRET.

The training arc is stationary. Turret is trained by two training pinions of twelve teeth each, gearing into rack on second deck below turret floor. A training motor, 440 volts, is connected by shafting to controller at the trainer's wheel and turns shaft which gears into vertical shaft which moves training pinion. The whip of turret through pinion is apparently taken up by worm and worm wheel connected to motor. By means of clutch power can be thrown out and turret trained by hand on second deck.

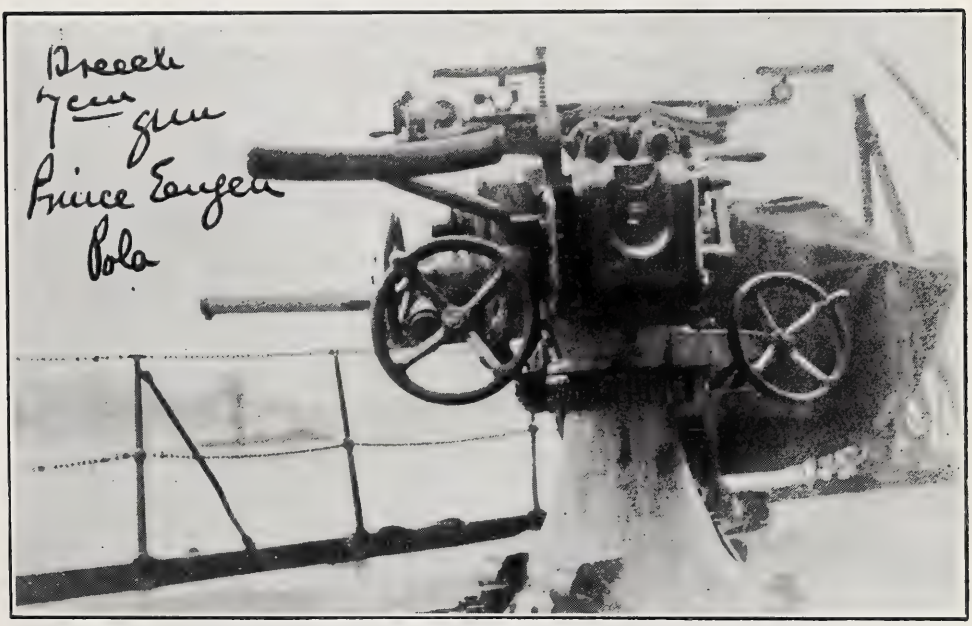
GUNS.

Guns are mounted very wide apart in comparison to our own. They are equipped with a quick action breech mechanism of modern Skoda type, which slides into a slit and is operated in a transverse direction by a bar or lever at the side of the gun. All guns are made at Skoda. Breech mechanism has a safety fitting. Guns are fired by electricity or percussion and are operated by electric motor or by hand. Guns cannot be fired until they are completely back to battery. Contact piece on yoke and slide account for this feature. Recoil cylinders (three in number to each gun) are operated by air and glycerine. No springs are used. Guns and breech mechanism are excellently balanced. Guns are all made on the built-up principle. Guns are very substantially supported by strong and heavy foundations and there are braces extending from the gun foundation to the deck above. There are two elevating arcs on each gun and the jump of the gun is evidently taken up by a rack and pinion to a shaft, for there appears to be a friction drum device for torque of shaft.

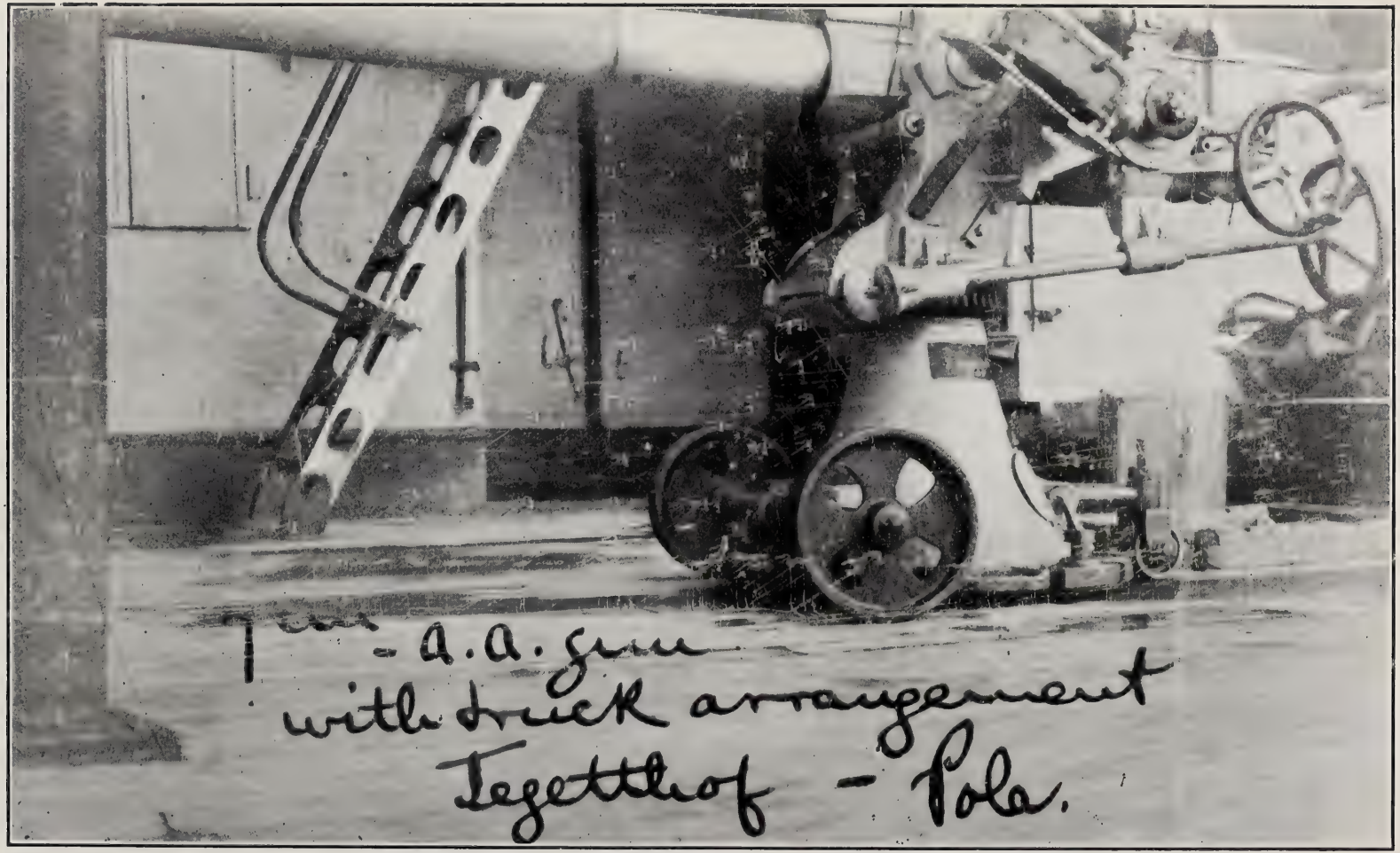
The Austrian guns of all types for 7 cm. up to 30.5 cm. are very well constructed, use cartridge cases and are fitted with the Skoda breech mechanism. The sliding type of Skoda breech mechanism is very simple, most reliable, easy to operate and care for. In the 30.5 cm. gun of the *Prinz Eugen* type, three revolutions of the operating handle opens the plug so easily that practically no strength is required for the operation.



7 CM. GUN ON AUSTRIAN BATTLESHIP *PRINCE EUGEN.*



BREECH 7 CM. GUN, AUSTRIAN BATTLESHIP *PRINCE EUGEN.*



7 CM. A. A. GUN WITH TRUCK ARRANGEMENT, AUSTRIAN BATTLESHIP *TEGETTHOF*.

SAFETY FEATURES.

Hoists are open and in general safety precautions are not well developed. Cartridge case ammunition undoubtedly precludes the necessity for excessive safety precautions. Empty powder tanks are removed from the turret by dropping them through a chute in floor of the turret, which in turn shunts them to the deck. No attempt is made to look out for them after they reach the deck.

COMMUNICATION.

Communication within the turret is mainly by 2-inch voice tube with call bell and indicator system. Voice tubes in general run from 1 to 4 inches in size and all tubes are heavy and well made. Voice tubes are fitted with plugs and also with screens, the latter to prevent articles from choking up the tubes. Turret officer communicates by voice tube with central station, with his ammunition supply and with the fire control officer. Efficient voice tube communication between pointers is fitted as in our ships.

BROADSIDE BATTERIES.

On the *Prinz Eugen* the broadside guns are Skoda made, 1913, with horizontal improved plug. Operating lever is on top and plug is opened with one movement outboard. There is no movement of revolution. Gun is extremely well balanced in elevation and there appears to be no excessive lost motion in train. There are two gears for train, general design being very similar to that found in our own guns. Adjustment of trunnions is by scale, which can be easily seen. Mounts and gun shields are very rugged and substantial. Protection from water due to rough seas appears good. In common with all telescopes found on Austrian ships the telescopes of these guns were in excellent condition and showed no moisture or dirt.

SUB-CALIBER GUNS.

The Austrians evidently used two kinds of sub-caliber; one about 30 caliber gun with a water cooled jacket, which was fitted to a bracket on the gun, the other a one pounder gun or very probably a three pounder, as it looked more like a three-pounder. The latter was of a very substantial make and was designed to be fitted inside the gun. These sub-caliber guns were stowed in brackets in the case mate.

Oil lights fitted with shutters were supplied to case mates. Electric battle lanterns, as we know them, were not fitted.

The general provisions on board these ships, such as silhouettes, first aid kits and spare parts, made a favorable impression. All were excellently placed and provided. The *Tegetthof* was apparently a very good gunnery ship. This was indicated in a number of ways.

The condition of ordnance equipment, fittings of special gadgets and general atmosphere denoted this. The 6 inch loading machine was located on the main deck and on a bulletin board nearby there was noted the results of the last loading competition of gun crew.

BATTLESHIP *FRANZ FERDINAND*—CONNING TOWER.

It might be generally stated that all Austrian ships have conning towers extending much deeper into the ship than in ours. They are located as in our ships directly over the central station and communicate directly therewith. Instead of having a central armored communication tube as we have, their conning towers extend to great depth and have a series of decks used for different purposes. The best example of this arrangement is probably found on the *Franz Ferdinand*. The roof of the conning tower is raised, providing an all around opening; the fire control tower has slits and is a small sector of the conning tower located forward of the conning tower and separated from it by armor. On the second floor down there is a steering station and conning station, but no slits. Floor three is a conning station, as is also floor four. It was noted that on the third floor of the after conning tower provision was made for the stowage of chronometers. In the newer ships the Austrians did not continue their conning tower to such a great depth. On the *Franz Ferdinand* there were apparently only two range finders mounted; one forward was a 9 ft. Barr and Stroud and the one aft was a 15 ft. Zeiss.

SEARCHLIGHTS.

All Austrian ships were bountifully supplied with searchlights. The searchlights of the dreadnaughts are 36 inch lights of the type Siemans-Schwkert, Murvek-Budapest-Pozsnony. They are provided with motor control from a distance as well as hand control.

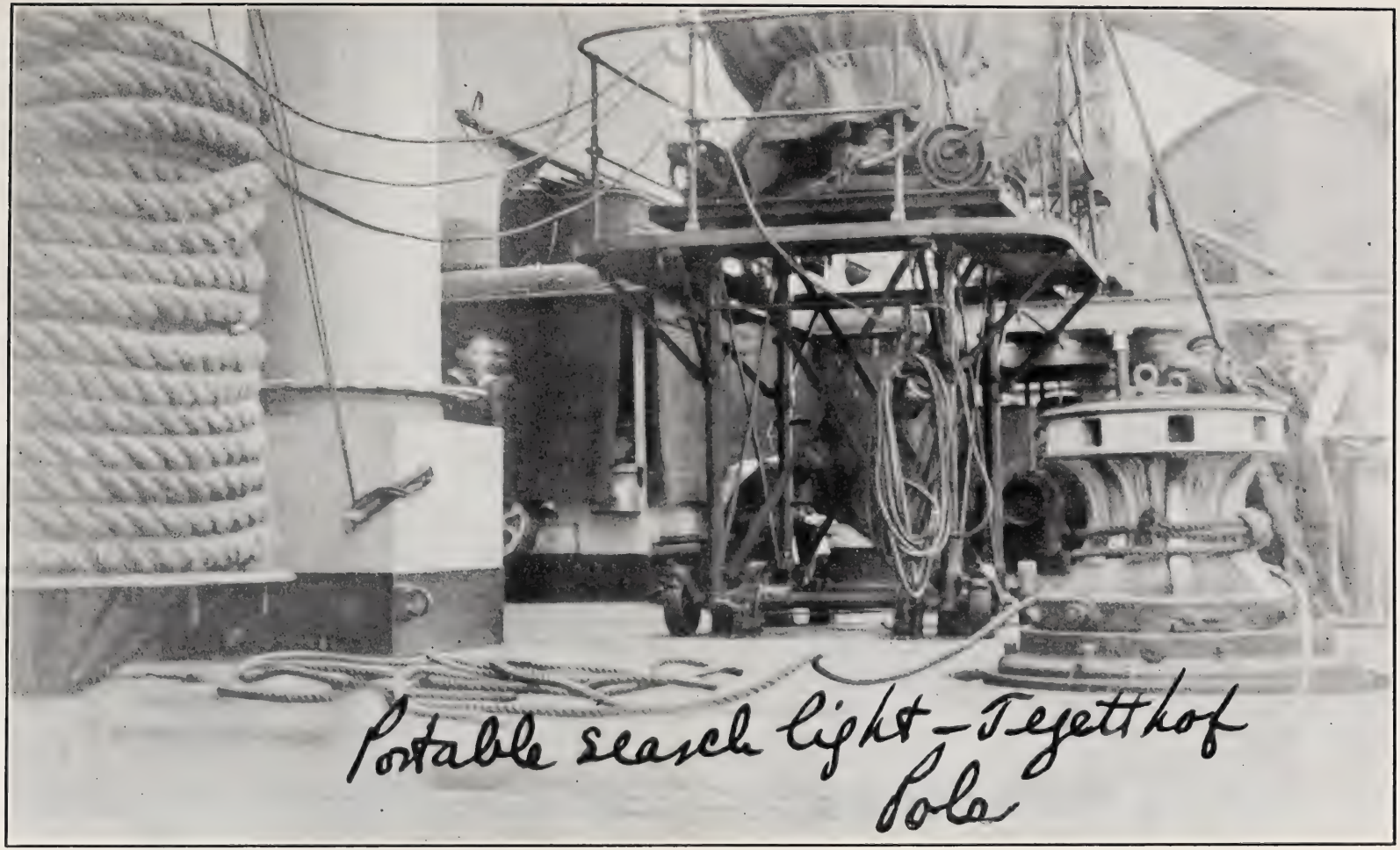
The *Tegetthof* was fitted with eleven searchlights, namely: three on the main mast (one on each side and one aft); four near the stacks (two to each side); two on cranes (one to each side); and two on forward bridge. All are mounted on trucks capable of movement or being locked into position. Those between stacks were on stand built across the ship. This permitted a very flexible arrangement and they were easy of access.

ANTI-AIRCRAFT GUN 7 CM. .50 CALIBER.

This gun, found on *Saida* and similar light cruisers, appears to be an exceptionally excellent gun. It is far ahead of any anti-aircraft guns that we have in the United States.

DESTROYERS.

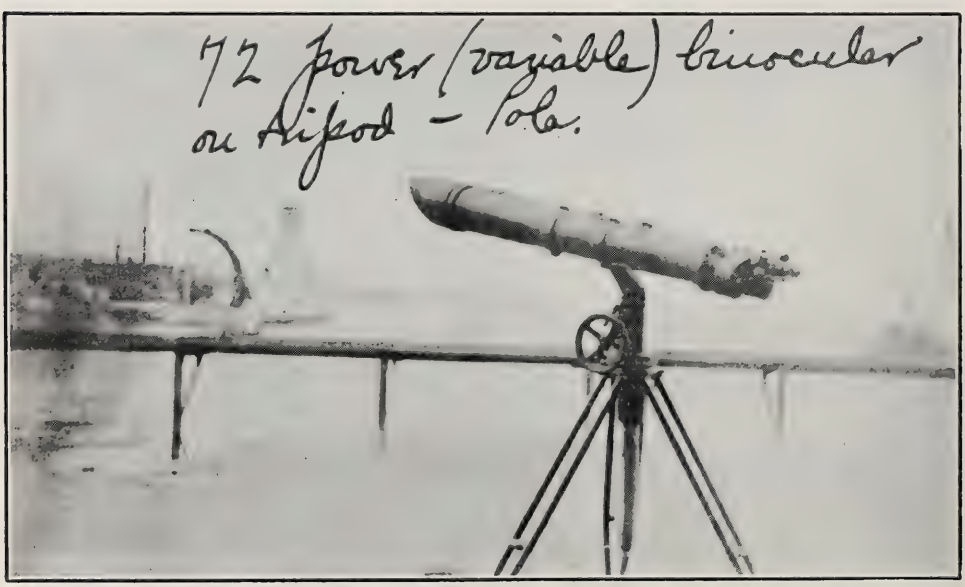
We inspected a number of destroyers. It was not worth time to visit many of them. They are in poor shape and of poor design, poorly armored and not well fitted. They were equipped with fog producing apparatus and depth bombs.



PORTABLE SEARCHLIGHT ON AUSTRIAN BATTLESHIP *TEGETTHOF*.



STARBOARD 15 CM. CONTROL TOWER, AUSTRIAN BATTLESHIP *TEGETTHOF.*



AUSTRIAN 72 POWER (VARIABLE BINOCULAR ON TRIPOD.

SUBMARINES.

There were about eight submarines tied up at the Arsenal, including the *UB 15*, *28*, *1* and *2*. They range from 250 to 800 tons and were all Austrian submarines. They have been stripped. On the Island Dock Yard there were about five submarines, some of them being of the larger type; several were on the ways and two or three tied up to the dock. The boats building were being built on German plans.

At the artillery station we were shown a book of "bad" (bath) pills with trade mark, price and general characteristics noted on the cover. These were bombs, made in Austria, and were stowed in a warehouse ready for delivery to Turkey. There was quite a supply of them. They looked very harmless and could be very easily carried in the pocket.

Upper and lower bridges of *Prinz Eugen* gave very good views forward and aft for control of ship.

Gyro compass was installed in central station, numerous repeaters were found on the bridge.

Usual telephone and voice tube communication.

Hand signal device for denoting changes of speed was installed on the bridge of the *Prinz Eugen* as well as on the bridges of several other ships visited. This was evidently designed to prevent confusion and talking during the operation of speed cones and other signalling apparatus.

Forward upper bridge was enclosed by glass windows.

Searchlights were controlled from lower bridge—distant control.

On deck near water ways, frames were numbered on circular metal discs about 2 inches in diameter.

Turrets were secured to deck by turnbuckles.

A seat of special design, apparently for a lookout, was noted on top of No. 2 turret.

On the top of smokestacks there was a system of special wire nets for use against aircraft attack.

Portable anti-aircraft gun noted. It was mounted on a low truck which could be wheeled around the deck and clamped into any position desired.

All instruments in conning and fire control towers were secured to an inner bulkhead clear of the armor.

The tops were particularly unstable and there was a notable lack of equipment in it. Evidently the top is used only as a lookout station or as a position for the spotter. For communication, the spotter has an indicator, voice tube and telephone. There is no other equipment.

GERMAN SUBMARINE *U 124*—MINE INSTALLATION.

Source: Commander L. N. McNair, U. S. Navy, and V. K. Coman, U. S. Navy. (Continuation of Report of Board of Inspection of Surrendered German Submarines.)

30 December 1918.

(11222A)

The mine compartment on vessels of this class, is situated in the after end of the boat. It occupies approximately 50 feet fore and aft.

The installation consists of the following:

a. Mine hatch.
b. Mine elevators with cars.
c. Mine racks.
d. Mine tubes together with operating mechanism.
e. Communications.

(a) Mine hatch.

The mine hatch covers an opening in the pressure hull, 6′ 8″ x 3′ 8″, at the forward end of the mine compartment. The hatch is rectangular and consists of a heavy casting convex on its upper surface and heavily ribbed. In its center there is a small auxiliary hatch the size of a manhole.

When the hatch is closed there are four strengthening bars which can be placed in position across the hatch opening; two of them are fitted with heavy turnbuckles to alter their length as desired.

(b) Mine Elevators with Cars.

Six feet below the mine hatch there is a platform about 8 feet long running athwartship. There is a track running across this platform with a rack alongside each track.

The platform is divided into three parts. The center part is stationary. Each side part is an elevator which can be raised and lowered at will. Each wing elevator carries a mine car mounted on the track above mentioned. The car resembles a half cylinder, open at both ends and is fitted with wheels.

In taking mines into the vessel one of the wing cars is rolled on to the stationary platform directly under the hatch, the mine is lowered into it, the car is rolled outbroad on to an elevator, the elevator is then lowered to a positon abreast the proper mine stowage rack and the mine is run off the car into the rack.

Each elevator is supported by four worm shafts, one at each corner, which revolve in worm bushings in the corner of the platform. These worm shafts are turned at equal speeds by means of

suitable shafts and pinions which lead to operating handcranks. (There may also be a motor for this work.)

(c) Mine Racks.

Running fore and aft on *each* side of the mine compartment and separated by a passage way, are three mine racks placed one above the other. They are built up of angle and channel bars. In each rack there is a bottom 6-inch channel bar along the center which takes the weight of the mine; at each side there is an angle iron guide rail, also a guide rail along the center of the top. The top rack will hold seven mines, the center one seven and the bottom one six; a total of 40 mines in the racks.

Alongside each middle rack on the inboard side, spaced about seven feet apart, are hand wheels which operate pinions which engage in the mine moving racks and are used to move the mines aft in the racks toward the mine tubes.

These racks are horizontal and approximately 36′ 4″ long, vertical height between tracks 3′ 5″. The width of each rack is 3′ 4″.

The elevators and cars are also used to carry mines from the upper and lower tracks into the middle, or loading track. In the space cut away aft from the lower racks is located outboard on each side the motors and control valves for flooding and draining the tubes.

On deck, running fore and aft, on each side, there is a mine track 150 feet long. This track continues down over the turtle back stern to a point where mines can be released.

(d) Mine Tubes—Together with Operating Mechanism.

There are two mine dropping tubes in the after end of the mine compartment—one on each side and in the same plane as the middle track of the storage racks. There is a narrow passageway between the tubes. The inner end of the tubes is 3′ 4″ abaft the stowage racks, and each tube has an inside diameter of 3′ 4″ and an estimated length of from 15 to 18 feet. Each tube will hold three mines. There is a separate installation for each tube for mine dropping, for flooding and draining tubes and for operating its doors. The inner and outer ends of the tubes are fitted with vertical sliding doors opening upwards. These doors are operated by motors over the inboard ends of the tubes. They can also be operated by hand. The inner doors are fitted with a hand locking gear.

Each tube is fitted with a mine travelling and dropping gear. Outside of each tube on its outboard side and running parallel to the tube is a main shaft. This shaft is revolved by electric motor located over the tube and convenient to the working platform between the tubes. Just forward of this motor is a cone clutch. The main shaft is con-

nected by worms and gearing to three short cross shafts equally spaced fore and aft along the top of the tube. Each one of the short cross shafts operates a pinion—which extends into the tube and apparently engages a rack on the mine in the tube. It is thought the racks on the mines take up close to one another and as the pinion engage the racks, the mines are passed along from one pinion to another until dropped over the stern. Each pinion is within a water tight casing built on the tube. The travelling and dropping of the mine is controlled by the clutch near the working platform running between the tubes. The mine dropping gear can also be operated by hand gear.

COMMUNICATIONS.

On the after bulkhead over each tube is an electric indicator—marked "Achtung 1, 11, 111." This is the signalling device from central when to drop mines. Outboard on each side just forward of the tubes are the valves for controlling the mine compensating tanks. Voice tubes run from the platform between the mine tubes to central and also to the forward end of the mine stowage rack. It is estimated forty mines can be carried in the stowage racks—six in the tubes and two in the carriages. Total mine capacity, 48.

It was noted as interesting that the ship's steering gear was swung overhead, between the tubes, from the deck above, and occupied but very little space. The after steering station was high up over the passageway between the mine stowage racks.

ITALIAN AERIAL TORPEDO.

Source: Reliable.

11 February 1919.

(4859.)

The Italians have an aerial torpedo which has a range of 14,000 meters. The torpedo, which looks like a miniature airplane, is launched with a small initial velocity from an airplane or dirigible. It has a propeller in the rear which is turned by motion of the torpedo through the air and itself turns a wheel with two cams which control a rudder to direct the torpedo up or down.

When the torpedo is launched, the cam is engaged, which directs the torpedo downward. In going down, the torpedo acquires a velocity. After a certain number of turns of the propellor, the cam is disengaged, the rudder is level and the torpedo glides along in practically a straight line. After a certain number of the turns of the propeller, determined by the angle between the two cams (adjusted in advance by a device which reads in terms of range), the second cam is engaged and steers the torpedo down against its objective.

The steering to right and left is done by a rudder turned by a device which works by compressed air and is controlled by a gyroscope. The gyroscope is driven by compressed air forced in by the motion of the torpedo. The explosive charge is at the front of the torpedo. This torpedo has undergone successful tests and a large number had been ordered when the war came to an end. A torpedo of the same type has been designed to dive under water after flying through the air in the manner described above.

ITALIAN ANTI-AIRCRAFT FUSE.

Source: Reliable.

11 February 1919.

(5037.)

For use with the aircraft gun, the Italians have a very sensitive point detonating fuse. To prevent the fuse from being detonated by air pressure, the firing pin is carried by a piece of aluminum which rests in a sort of cup at the point of the fuse and has a hole at the tip which lets air at high pressure inside this aluminum cap and thus increases the pressure inside enough to hold the firing pin forward. On striking any obstruction, the hole is closed and the firing pin driven back. The fuse will detonate against the fabric of the wing of an airplane.

OPERATIONS.

ACTIVITIES OF UNITED STATES NAVY IN EUROPEAN WATERS—ORGANIZATION OF HEADQUARTERS.

Source: Intelligence Section of Admiral Sims' Staff.

3 August 1918.

Although this article is several months old, it is published as being of value in a study of organization, in addition to its general interest.

GENERAL ORGANIZATION OF THE U. S. NAVAL FORCES IN EUROPEAN WATERS.

Since the predominate naval effort in the war was British, due to the size and range of activities of the British Navy, and since the British Navy is controlled from the Admiralty in London, Admiral Sims selected London as the location of his headquarters for the purpose of directing the participation of the United States Navy in the naval campaign in European waters.

Since France was an invaded country, it was but natural that the predominate national interest of France was centered in its armies; as a result the French Navy has undoubtedly suffered, and was not able to expand to any considerable degree during the war.

The Naval Attachés at Paris and Rome were the medium of communication between the Force Commander and the Ministries of Marine in France and Italy, and they kept him in constant touch with the naval situation in those countries. He made frequent trips to Paris and an occasional trip to Rome. The Naval Attachés in Holland and the Scandinavian countries kept him constantly in touch with all information they obtained.

There was direct telephonic communication between the British and French Admiralties, and, in addition, the French Admiralty kept an Admiral with a staff on duty in London, who cooperated with the Force Commander's staff.

The organization of the British Admiralty includes a highly efficient Intelligence Division, through which all important Naval information was made available to the Force Commander at all times.

It was therefore unnecessary for Admiral Sims' organization to include a large staff for collecting information; however, a small

Intelligence Section was necessary for collating, digesting and disseminating information.

It was at first proposed to establish Admiral Sims' Headquarters in the British Admiralty, but on account of the congested condition of the Admiralty offices it was finally decided to establish the U. S. Naval Headquarters near the Embassy.

Admiral Sims attended the daily conferences of the Naval Staff at the Admiralty and, in addition, each officer of the Admiral's staff kept in close touch with the corresponding division of the Admiralty.

In order to facilitate communications between the Admiralty and the U. S. Naval Headquarters and to establish a liaison service, a British naval officer assigned to Admiral Sims' staff had an office at the Admiralty and a desk at Admiral Sims' Headquarters; any division of the Admiralty desiring any information from or consultation with individual members of Admiral Sims' staff were enabled to do this through this officer. Similarly, officers of Admiral Sims' staff were enabled quickly to obtain information from the Admiralty.

Special telephone and telegraph wires were installed between the Admiralty and the U. S. Naval Headquarters.

The allied Naval Council, consisting of the representatives of France, Great Britain, Italy, Japan and the United States, met frequently in London or Paris to discuss important questions concerning the naval campaign and particularly the disposition of forces.

The natural inclination of a naval service, which is a team by itself, is, of course, to operate together as a team. Admiral Sims believed from the beginning, however, that the only effective way to throw the weight of the U. S. Navy into the war without delay was to use its available units to strengthen the weak spots in the other Navies, and thus effect a more vigorous conduct of the war already so thoroughly underway in all areas.

There would have been much wasted effort and time if any attempt had been made to take over any particular area and operate it entirely with U. S. Naval Forces. Hence, as the various naval forces have been rendered available by the Navy Department, the question of the best location for them has been discussed with the representatives of the other Navies and the disposition has been the result of common agreement.

Admiral Sims' Headquarters might have been considered the advanced headquarters of the Navy Department in the field. The Department dealt only with Admiral Sims' Headquarters and Admiral Sims in turn directed and co-ordinated the work of all the various groups under his general command.

All groups, wherever located, reported regularly to Admiral Sims concerning their activities and operations, their condition as regards

material and supplies, their needs, and their plans, together with recommendations or suggestions for change in plans or policies. Admiral Sims in turn kept the Department informed by general reports of the activities of all the forces under his command. Daily matters of importance or of current interest were handled by telegraph or cable.

UNITED STATES NAVAL HEADQUARTERS—EUROPE.

In order to carry out the organization and meet the demands outlined above, Admiral Sims' Headquarters was divided into various sections. The following is a list of these sections with very brief outlines of their functions.

1. Chief of Staff.

The Chief of Staff handled only important questions concerning plans and policies and the disposition of forces, and rendered decisions on questions affecting the various sections of the staff.

2. Planning Section.

The Planning Section was composed of three Captains and a Lieut. Colonel of the Marines, all of War College training, who had no administrative duties. It was their mission to keep themselves informed of the general situation, to carry on a constant study thereof, and to prepare and submit studies or plans covering proposed future operations or changes in present operations and methods, whenever in their opinion these were advisable.

Whenever new problems were encountered, the Planning Section was asked to make a comprehensive study of them before decisions were taken.

The Planning Section worked in close cooperation with the corresponding Planning Section of the Operations Division of the British Admiralty.

In addition to making studies of problems and preparing plans for future operations, the Planning Section also fulfilled the function of a critic of the organization and methods in effect in the forces.

3. Operations Section.

The Operations Section handled the convoying of all U. S. Navy and U. S. Army shipping, kept track of the location of all U. S. Naval and merchant ships and, in close co-operation with the Admiralty, acted upon all cablegrams dealing with the routings of convoys and the assignment of escorts. The Operations Section prepared all orders to forces which affected their employment.

The Operations Section also had charge of the antisubmarine work and the operations of submarine chasers.

4. Matériel Section.

The Matériel Section kept itself informed of the requirements of all forces as regards supplies of all description, including money, fuel, oil, coal, food and clothing and repair materials.

It also supervised all financial dealings with foreign governments in connection with expenditures for the Navy. Arrangements were made with the Allied Governments by which our ships could put in to any of their naval bases and obtain urgent supplies just as if they belonged to the Navy of the country. Commanding Officers of such vessels signed the necessary receipts covering the supplies they received and these finally reached the Admiralty or the Ministry of Marine, as the case may be, and were referred to U. S. Naval Headquarters for auditing and reimbursement.

5. Repair Section.

The Repair Section kept in touch with the needs of all forces in the matter of overhauling and repair, arranged with the different Allied services for repair and docking facilities and kept the Department informed in regard to the material which must be provided from the United States.

6. Ordnance Section.

The Ordnance Section kept in close touch with the requirements of all forces as regards guns, ammunition, depth charges, and ordnance equipment of all kinds. It also followed closely mining operations and co-operation with the Admiralty and with the Mine Force in carrying these out.

7. Medical Section.

The Medical Section had general supervision over all Naval Hospitals, kept informed of the location of all sick and injured and of their disposition and arranged to have them cared for in Allied Hospitals wherever they could not be treated in our own Naval Hospitals. There were, in August 1918, three Naval Hospitals in commission in Europe; one at Strathpeffer, Scotland, one at Queenstown, Ireland, and one at Brest, France. In these, and in certain Red Cross Hospitals devoted entirely to naval use, there were more than three thousand beds.

8. Aviation Section.

Before the Naval Aviation Service could begin operations, it was necessary to establish aviation stations, equip them, provide planes and train the personnel. This work was placed under the direction of Captain H. I. Cone. Captain Cone established headquarters at Paris and the Aviation Section of Admiral Sims' staff had as its chief function the work of assisting Captain Cone in every way possible and

particularly by establishing the closest possible co-operation with the British Air Service.

As fast as the stations that were being built and equipped were ready for operation, they were placed under the commanders in the different areas, who directed their operations just as if they were surface naval craft. There were, in August 1918, 27 U. S. Naval Air Stations in England, Ireland, France and Italy, with a total personnel of 300 pilots, and 11,000 machinists and other assistants.

9. Intelligence Section.

Since the time of all officers of various sections of the staff was completely taken up by their immediate duties and the current business, it was necessary to have a section for the single purpose of obtaining and furnishing information which might affect the work of the various sections. For example, the Intelligence Section followed the movement of all enemy submarines, studied their methods of operation and kept the Operations Section supplied with the latest information available in order that convoys might be safely routed and handled.

The different sections of the staff called upon the Intelligence Section to collect and prepare information on a great variety of subjects. Examples of the questions received are as follows:—

(a) What has been the percentage of sinkings by submarines in the various seas for June and July, 1918?

(b) What is the proportion of shipping passing into the English Channel to that passing into Gibraltar?

(c) What information is there available as to engagements of U. S. Naval Vessels with enemy submarines and the results of these actions?

The Intelligence Section was constantly engaged in making summaries of information and compiling statistical and other data in convenient form for the information of the other sections of the staff.

The Intelligence Section also transmitted all important information received and the results of its own investigations to the Department, to Army Headquarters, and to the operating forces. It worked in close cooperation with the Intelligence Division of the Admiralty, and one officer, who was especially detailed, spent a great part of his time in the Admiralty Intelligence Division. In this way it was possible to obtain for the Department all information available concerning enemy submarines and the submarine campaign, methods of attack and operations of the enemy, and information as to their future plans, which was obtained by the Admiralty from prisoners or through their own intelligence service.

10. Disbursing Section.

The Disbursing Section had general supervision over all financial disbursements for personnel and those required for the administration of the U. S. Naval Headquarters.

11. Communication Section.

The Communication Section arranged all lines of radio, cable, and telegraph communication between the forces operating under Admiral Sims and with the Navy Department. The cable and telegraph office established at Admiral Sims' headquarters was operated by U. S. Naval personnel. There were direct wires to the cable and telegraph lines of communication throughout Europe. All dispatches to and from the Navy Department and the forces in European Waters passed through this office. During the month of June, 1918, the average traffic in received and sent messages was 13,000 five letter code groups each twenty-four hours.

Practically all naval dispatches were handled in navy codes and ciphers.

The Communication Section also worked in close cooperation with the Signal Division of the Admiralty, supervised the use of codes, ciphers and radio communications of the forces under Admiral Sims and looked after the distribution of codes and ciphers to these forces. Trans-Atlantic radio stations in France and the United States were used for certain classes of dispatches and a system was perfected for the use of trans-Atlantic radio in case of the breakdown or cutting of the trans-Atlantic cables. A trans-Atlantic radio receiving station was installed at Headquarters, which received messages from the United States, France, Germany and Italy.

The head of this section was a member of the Inter-Allied Signal Conference and of the Inter-Allied Radio Commission, which met quarterly for the purpose of administering the communications of all the Allied forces.

The Communication Section was also in close touch with the Admiralty and Royal Air Force Radio Material Divisions and supervised all radio material for naval vessels and shore stations under Admiral Sims. Radio telephones and radio direction finders were installed in U. S. Naval vessels and U. S. Naval Aircraft. Radio repair bases were established at convenient shipping points throughout Europe.

12. Personnel and Secretarial Section.

The Personnel Section, under the direction of the Flag Secretary, kept a record of the location of all officers and men in Europe, issued all necessary orders and provided transportation for all officers and men.

There were in August 1918, 47,000 enlisted men and 3,542 officers of the Navy serving in European waters (including Naval Aviation personnel). There were then over 250 vessels, including 77 submarine chasers, under Admiral Sims' command. Twenty-five other chasers and numerous other vessels were designated or en route.

This section also administered the handling of all correspondence and supervised the mail service for the forces in European waters. A complete card index of all men serving in European waters was maintained and many thousands of personal letters were forwarded each week to the proper addresses. This section also provided and supervised the clerical staff at Headquarters, and administered the Headquarters buildings.

13. Administrative Section.

All correspondence and telegraphic communications passed through one office, whose function was the co-ordination of the work of the various sections. This office, directed by the Assistant Chief of Staff, was thus enabled to make sure that the members of the staff did not work at cross purposes. If letters or telegrams originating in one section affected other sections, they were referred to them before being sent out.

UNITED STATES NAVAL FORCES IN EUROPEAN WATERS.

United States Naval Forces operating in European waters during the war may be briefly grouped as follows:

(*a*) *The Force based on Queenstown* handled certain merchant convoys coming to France and to the United Kingdom and also fast British liners carrying U. S. troops. This force was composed of twenty-four destroyers, two tenders and three tugs. Two additional destroyers of this force were temporarily assigned to duty at Plymouth with the submarine chasers, and one was in the United States for the renewal of her boilers in August 1918.

(*b*) *The Force based on the French coast* escorted troopships into the French ports and out to sea, assisted the French in escorting Coastal Convoys up and down the French Coast and across the Channel to England and aided the French in keeping the Channels clear of mines. This force consisted of thirty-three destroyers, sixteen yachts, nine mine sweepers, five tugs, four repair ships, one barrack ship, two barges, and one tug which was temporarily assigned to duty in the Azores.

(*c*) *The Force based on Gibraltar* worked with the British in escorting Allied trade in and out of the Mediterranean. This force consisted of two scout cruisers, five destroyers, six coast guard cutters, five gunboats, and ten yachts. In addition, one destroyer and one gunboat of this force were in the United States for a general overhaul in August 1918.

(*d*) *At Plymouth, England*, there were 41 submarine chasers with two destroyers and one tender. These were engaged in hunting submarines in the entrance to the English Channel. There was also one submarine from Boerehaven at Plymouth on temporary duty.

(*e*) *At Berehaven* were six submarines with a submarine tender engaged in hunting enemy submarines off the entrance to the Irish Sea and the English Channel.

(*f*) *At Corfu* were 36 submarine chasers with a tender, which were engaged in hunting submarines in the Adriatic Sea.

(*g*) *With the Grand Fleet* were five battleships operating as a battle squadron of the fleet.

(*h*) *The Mine Force*, based on Inverness and Invergerdon, worked with the British in the laying of mines in the North Sea. This force was composed of ten mine planters, one repair ship and two tugs.

(*i*) *The Force based on the Azores* was engaged in patrolling in the vicinity of the Azores to keep the route clear in order that our submarine chasers and other craft could safely use the port for coaling and obtaining supplies while en route to Europe. This force was composed of four submarines, one gunboat, one monitor, two yachts and a marine detachment on shore. There was also one tug from the Brest Force on temporary duty at the Azores.

(*j*) *There was a fleet of merchant ships* engaged in carrying coal for the U. S. Army from England to France, which were under Admiral Sims' general control. Seventy-three such ships were commissioned.

(*k*) *There were at Southampton* four cross-channel transports engaged in carrying troops across the channel. These were commissioned ships under Admiral Sims' command.

(*l*) *At Murmansk, Russia*, there was one cruiser co-operating with the Allied forces in Russia.

(*m*) *At Genoa* there were two tugs, which were placed at the disposition of the Italian government.

(*n*) *At Liverpool* there were two tankers.

COMPARISON OF ALLIED NAVAL FORCES IN EUROPEAN WATERS.

While the United States Navy did its bit and did it well, a sense of proportion must not be lost. Our effort was small compared with that of our Allies.

In this connection the following approximate percentages are of interest as giving a comparison between the naval efforts of the Allied Powers. The percentage of the various types of vessels engaged in the

anti-submarine campaign in British Waters and Eastern Atlantic is about as follows:

	Great Britain.	France.	United States.
	Per cent.	*Per cent.*	*Per cent.*
Destroyers	80	6	14
Submarines	78	17	5
Miscellaneous	86	11	3

The following percentages give a similar comparison of the naval situation in the Mediterranean:

	Great Britain.	France.	Italy.	Japan.	United States.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Destroyers	27	38	26	7	2
Submarines	13	37	50	0	0
Miscellaneous	22	66	4	0	8

In the Grand Fleet, Great Britain had about 91% of the major fighting forces and United States 9%.

Of the total number of all patrol craft operating against enemy submarines in British and Eastern Atlantic Waters the American patrol forces constituted less than 5% of the total number. In the Mediterranean the United States supplied 6% of the patrol forces.

As a comparison between the naval aviation effort of Great Britain and the United States, the following data are of interest:—

Great Britain has about 4½ times as large a naval aviation personnel as the United States, and about three times as many naval aviation stations. Great Britain has approximately 14 times as many seaplanes as the United States and these British machines patrol eight times as many miles during the week as the American machines.

On August 1st, 1918, it was estimated that the British Navy had on active service in European Waters approximately over three times as many officers and over four times the enlisted personnel of the American forces operating in European waters. This estimate must be assumed as low because it does not include the hundreds of officers and thousands of men the British have in their so-called auxiliary patrol service.

A further significant illustration of the relative parts being played by the U. S. Navy and the Allied Navies is given by a study of the Atlantic Convoy System and by the protection and escorting of American troop convoys to Europe.

Taking into consideration the whole Atlantic Convoy System—that is, all shipping in the Atlantic, whether French, Italian, American, British, or neutral shipping in Allied interests—also U. S. troop transports and troop convoys bound for the Mediterranean—the shipping was protected by the naval vessels of the Allies in the following proportions:—

Great Britain provided Destroyers for 70% of all convoys.

United States provided Destroyers for 27% of all convoys.

France provided Destroyers for 3% of all convoys.

All convoys at sea in the Atlantic were protected by cruisers so as to guard against attack by enemy raiders. The cruisers necessary for protecting the Allied shipping in the Atlantic in this way were provided as follows:—

Great Britain, 61%.

United States, 35%.

France, 4%.

Great Britain organized, arranged, and provided the signal codes and instructions for the entire convoy system; also commodores and signal men for the great majority of all convoys.

The convoy system usually carried the shipping as far as the European coast, where it was generally diverted on a coastal route to its destination. This necessitated a great amount of coastal escorting. Great Britain provided coastal escorts for the Irish Sea, English Channel and North Sea, and, in general, throughout all coastal waters of the United Kingdom.

Great Britain also provided destroyers for all Allied shipping across the North Sea, escorts for practically all shipping across the English Channel between England and France, and also kept all channels in British Waters clear of mines.

There was very little coastal escort required on the French Channel coast as all shipping follows the English coast. On the French Atlantic coast, the United States furnished three-eighths of the coastal escort and France furnished the remaining five-eighths. The United States also furnished about one-third of the mine sweeping forces on the French Atlantic Coast.

British Destroyers are now (August 1918) rendering the following protection to United States shipping:

U. S. Troops.

(*a*) British destroyers escorted 62% of the U. S. troops that came into England.

(*b*) British destroyers escorted all of our troops that crossed the English Channel going to France.

(*c*) British destroyers escorted all U. S. troop ships bound up or down the English Channel.

Army Store Ships.

(*a*) British Destroyers brought into the English Channel about half of the store ships that carried supplies for the U. S. Army.

(*b*) British destroyers escorted into Scottish ports all U. S. mine carriers bringing mines for the North Sea barrage.

U. S. Merchant Shipping.

(*a*) British destroyers provided the coastal escort for U. S. Ships along the South and East coast of England.

(*b*) All U. S. trade with Scandinavia was escorted by British destroyers.

(*c*) All U. S. trade with Holland was escorted by British destroyers.

(*d*) All U. S. ships bound out of the English Channel from either French or British ports were escorted to the westward by British destroyers.

RUSSIAN BALTIC FLEET—CONDITIONS.

Source: Reliable.

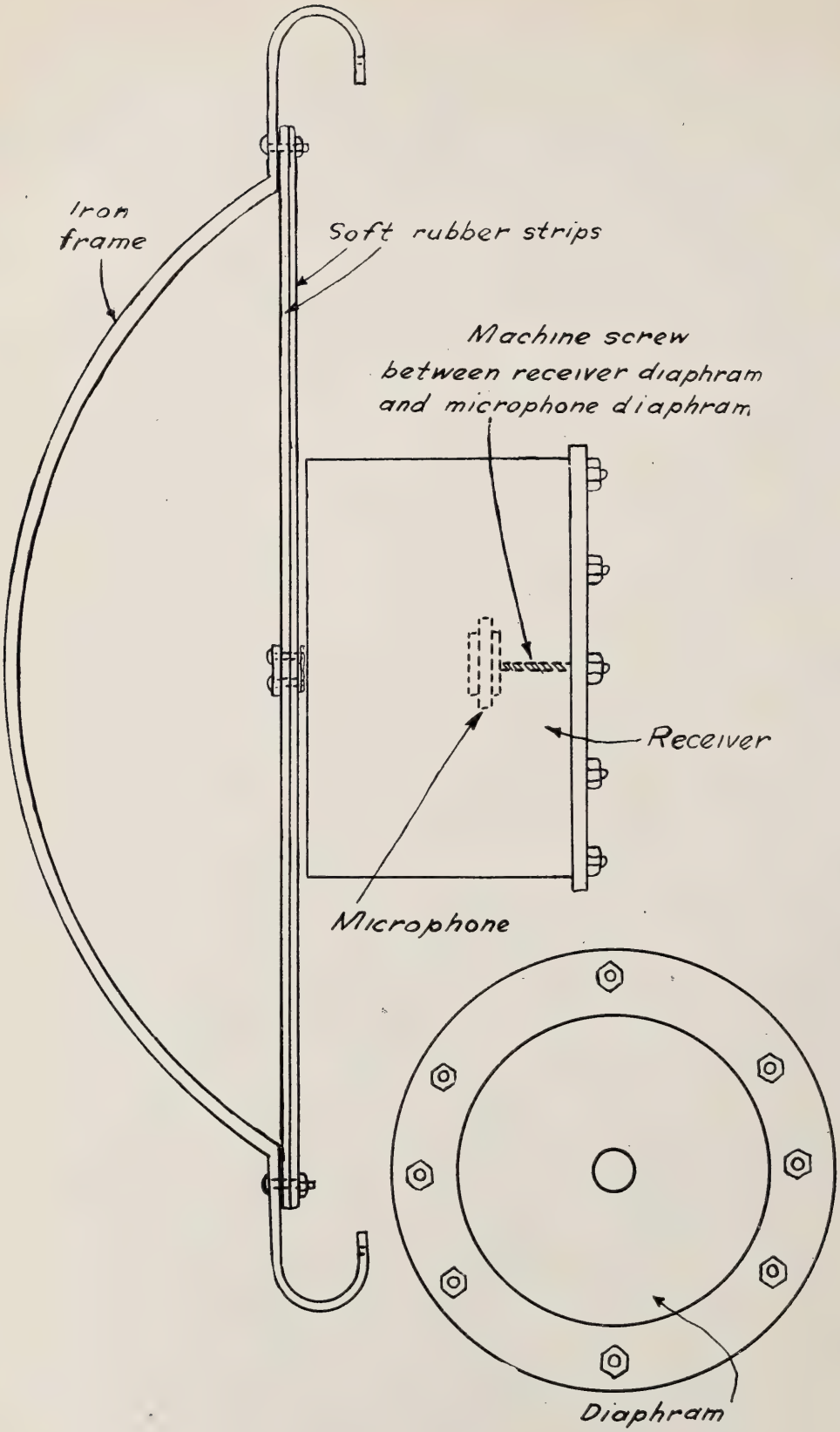
7 February 1919.

(11275.)

The feeling amongst the sailors of the fleet is such that they refuse to go further than Cronstadt, pointing out that they do not intend to fight against the Allies and that it is impossible to oppose the British fleet. In order to compel some of the ships to put to sea the commissars devised the following means: destroyers manned by communists are sent out behind the ships intended for operations so as to drive them on and cover their retreat.

The sailors state that the personnel of the destroyers *Spartak* and *Avstrail* (recently captured by the British) were considered unreliable as very few communists were on board. All the sailors complain of being badly fed, continually being searched and reported, and say that they are serving simply because they are made to. The cruiser *Admiral Makaroff* was visited, which showed great disorder and unprecedented neglect.

The mobilized sailors in the second Baltic fleet are hostile towards the Soviet government but fear repressions and betrayers.



German Microphone

COMMUNICATIONS.

GERMAN SUBMARINES—SOUND SIGNALLING AND LISTENING DEVICES.

Source: Commander C. S. McDowell, U. S. Navy, and Lieut Commanders A. C. Dibrell and F. F. Leighton, U. S. Navy.

30 December 1918.

(11222E.)

Signalling.

The sound signalling apparatus consists of a motor generator, situated usually in forward torpedo room, of about 2KW., 1050 cycles, 220 volts; a transmitting switchboard and starter in radio room; a receiving cabinet, also used as noise receiver, in the radio room; and two oscillators installed through the hull in forward main ballast tank, one on each side of the keel. The oscillators are apparently similar in principle as the Fessenden oscillator, the principal difference being that a higher pitch is used. The oscillators were operated in several of the submarines without difficulty.

Sound Receiving.

Microphones are installed on deck forward between strength hull and deck plating and in ballast tanks on both sides forward and aft, for receiving and detecting sounds of ships and for use in receiving sound signals. At each location there are two microphones, one a low pitched microphone for low frequency sounds and the other a high pitched microphone. Either microphone may be used, depending upon the character of the sound detected and the character of interfering noise. There are two tuned circuits, either of which may be used depending upon whether the high frequency microphone or low frequency microphone is desired. If desired the sound can be received direct without tuning.

There is a switch on the receiving panel for throwing in the connection to the conning tower and permitting listening in at that station. There is a telephone jack with cap cover in a pair of phones.

There is a series adjustable resistance in the phone circuits by which the loudness of the received sound may be approximately measured and the distance of the sound produced be estimated.

Microphones.

The microphones used contain finely powdered carbon between two metal disks. The microphone is mounted, as shown on attached sketch, on a rubber strip which is supported by a bent steel strip. This steel frame is bolted to two lugs (in the case of the deck microphone, the only one which could be examined) so that the face of the diaphragm was in a vertical plane. The deck microphones were located forward, between the strength hull and the deck plating. The two microphones are of different sizes, the one low pitched and the other high pitched.

DESCRIPTION OF NEW TYPE OF MICROPHONE LISTENING DEVICE OBTAINED FROM GERMAN SUBMARINES IN AUSTRIA.

Description of and Method of Using Hydrophones for "U" Boats.

The purpose of the hydrophone is that a "U" boat should be enabled to hear ships which are passing and also to be used to pick up the sound from submarine bells located on light ships.

Because of the great sound conductivity of water, it is possible to hear sounds made under water by submarine bells, moving vessels, etc., at a considerable distance.

For this purpose microphone receivers are placed on the inner side of the under water body of the ships.

The receivers are microphones connected to a telephone circuit. The microphones are attached to the inner side of the ship's body below the water line, while the telephone listening station can be placed at any point in the ship which may be suitable.

With a microphone receiver installed as above described, the sound is heard strongest when the source of the sound is at right angles from the line of the ship. If the source of sound moves either forward or aft, the sound becomes gradually less and the strength of the sound is least when the source of the sound is directly ahead or directly astern.

In consequence of this, it is possible to determine the location of an object which is passing under water sound and to steer toward it. If an under water sound is heard stronger on either the port or starboard microphones, then the source of sound is on that side of the vessel. If the microphones are placed on the forward part of the ship and the sound is heard with equal intensity on both receivers then the source of sound is directly ahead.

Such receivers are of a directional nature. The connection between the microphone with the sound diaphragm is known as the microphone connection. The operation of this connection is as follows: The striking of sound waves against the diaphragm causes vibra-

tions in the diaphragm of a like cycle and number. These vibrations of diaphragm are then transmitted to the microphone.

The microphone is filled with pulverized carbon, which causes a resistance in the circuit which is greater or less, according to the density of the carbon body. By means of the transmission of sound from the sound diaphragm, the microphone is set in motion in time and tune of the source of sound. In consequence of this the contacts between the carbon particles are brought into the same tune. The microphone resistance is changed by the striking of each sound wave on the receiving diaphragm to correspond to the tune of these sound waves. Each such change of the microphone resistance causes a corresponding flow of current in the microphone alternating circuit. This causes variations in the circuit in tune with the sound waves, by which they were caused. The thereby induced alternating current has a frequency in tune with the sound waves. This alternating current is transmitted through transformer to telephone circuit. This causes the strength of the magnetism in the telephone magnets to be changed into the same tune, which in turn causes vibrations in the diaphragm which are in parallel with the sound waves striking the receiving diaphragm.

Care of the Apparatus.

Through use the batteries gradually become exhausted and in consequence the microphone circuit strength diminishes. By means of the regulating resistance this current strength must from time to time be adjusted.

When the battery has been exhausted to the points where by means of the regulating resistance, it is no longer possible to obtain the proper strength of current, it will be necessary to replace the dry cells.

When new dry cells are placed in the battery the regulating resistance must be placed at its highest point of registering, in order that when the switch is first thrown in the current will not be of such a strength as to damage the microphone. After the switch has been cut in, the resistance is adjusted to the proper strength of current.

In order to change the dry cells, the cover is removed after taking out the screws; after removing connecting wires, the dry cells themselves may be removed.

Only dry cloths are to be used in cleaning the outer parts of the hearing apparatus. It is not advisable to point the apparatus, as switches are damaged thereby.

The replacement of microphones requires great care and skill and can only be done by personnel entirely familiar with the apparatus.

Disturbances.

Disturbances on the receiving apparatus may be caused:

(1) Through faults in the transmitter in the source of the sound.

(2) Through conditions or happenings in the sound transmitting matter.

(3) Through faults in the receiver.

Disturbances in the sound transmission may be due to:

(1) Incorrect tuning in order to receive.

(2) Poor transmitting material.

(3) Faulty adjustments.

These cause the sound received to be either very low or quickly changing from very long to very soft. Often individual sounds will be eliminated so that their recognition is difficult.

Conditions in the water between the source of sound and the receiver are affected by the following conditions:

(1) That there may be great variations of depth in the water body between the source of sound and the receiver, sand banks or points of land.

(2) Water currents, particularly those of a temperature different from the immediately surrounding water.

(3) Propeller wake of one's own, or another vessel.

(4) Heavy seas.

The effect of the above is that the sound received is very weak and oftentimes disappears entirely.

Disturbances causing failure on the receiver are:

(1) Loud side noises either on board or from outside intervals.

(2) Faults in the microphone equipment, in the wiring system, or in the hearing apparatus.

(3) Faulty adjustments.

The faults in (2) may be due to:

(1) Short circuits in the hearing apparatus, in the box, or in the wiring.

These are shown by the high registering of the milliamperemeter yet, no sound in the telephone.

(2) Breaks in the hearing apparatus, in the switch box, or in the wiring.

This is shown by the milliamperemeter registering zero, on all adjustments of the resistance coil, while the telephone remains dead.

(3) Swinging-opens in the wiring.

Indication: Crackling sounds in the telephone. The milliamperemeter may show normal conditions.

(4) That the microphone may be burned out due to too strong a current.

Indication: Hissing and ringing sounds in the telephone. The milliamperemeter may show normal conditions.

Remedy: Shifting of cable pairs of microphone equipment.

(5) That the water in the space between the receiving diaphragm and the microphone may have leaked out.

Indication: Very weak or entire absence of sound receiving on that particular receiver, although everything else may be in perfect condition. By rapping on the walls of the water container, it is possible to determine whether it is empty.

Remedy: Refill the container with water.

(6) Non-sensitive telephone.

Indication: Weak receiving, even ships' sounds in being transmitted.

Remedy: Changing the telephone.

(7) A broken telephone cord.

Indication: In the affected telephone, no sound or occasional sounds are to be heard, although the milliamperemeter indicates normal. By external examination of the cord and by trial at apparently broken parts. Thus found, the contacts may be reestablished.

Remedy: Replace cord.

(8) Batteries are exhausted.

Indication: It is impossible, even though the resistance is changed, to obtain sufficient current.

Inasmuch as the maintenance of the receiving apparatus is very simple, faulty handling should not occur if careful attention is given to the preceding paragraphs.

ITALIAN NAVY—LISTENING DEVICES.

Source: Report of Inspection.

18 February 1919.

(11342.)

The Italians have not invented or improved any practical form of underwater listening device for the detection of submarines, nor have they put into practical use any devices except those that have been obtained from the British and American governments. They have carried out some experimental work at Spezia, Venice, and Taranta, but none of their experiments have led to the adoption of any of their detectors for practical use. The following apparatus, furnished by the American and British Navies, has been used by them during the present war:

(*a*) *C* tubes. About a thousand of these tubes have been made by the Italian government for use aboard patrol boats, torpedo boats, mine sweepers, etc., although not more than a hundred have actually been installed during the war. Their C tube is a copy of our early

overboard type, of lighter material and less rugged, but easier to handle. Like all C tubes, these would be absolutely useless in a heavy sea; this Italian type would probably stand even less heavy weather than our standard form. Since the conclusion of hostilities these tubes have been stored at Taranto.

(*b*) *British Hydrophones, Mark I and II (Microphone Devices).* These have been used, with success, both on surface boats (from which they were used outboard, suspended in the water), and on the Italian submarines (to which they were permanently attached to the hull as listening plates). No information is available as to the number actually put into use, or the extent to which they used them. This work was done in conjunction with the British Navy at Taranto.

(*c*) *Tripod listening stations.* Many of these tripod stations were planted in the straits of Otranto, off C. Santa Maria, and off Gallipoli and the entrance to Taranto harbor. Each station consisted of one hydrophone, mounted in a heavy iron frame, and a two conductor cable running to the listening house on shore. The Hydrophones were of British make, similar to a Mark II device, except that the diaphragm, which was of steel, was extra thick (6 mm.) to withstand deep pressures. The microphones buttons were mounted on a small lever, so that the diaphragm could be mounted in a horizontal position. A small tapper, operated by alternating current from the shore, was provided for use in case the microphone became inoperative through packing. The Hydrophones were non-directional, and the approximate location of a submarine could be told only by the difference in intensity of the sound given by two or more tripods.

There was no binaural principle for the determination of direction such as was employed in our tripod stations off Norfolk and New London. But there was one advantage in these tripods, in that they could be placed as far as twenty miles from shore, whereas our tripods have been limited to distances of four miles, unless special loading boxes or transformers were placed in the cables at frequent intervals to balance the effect of long cables.

(*d*) *Listening School.* During the war, and at the present time, instruction in listening is given at the Naval Station at Gallipoli, near Taranto. Sailors and officers are trained there in the practical use of listening devices, in a similar manner to that used at our Hydrophone School at New London. There are several submarines stationed at Gallipoli for this purpose. In December 1918 the school was reorganized, with a Capitano di Corveta in charge, and it is thought to be the intention of the Italian Government to enlarge the place. There has been some talk of moving the hydrophone school to Spezia or Venice.

GERMAN SUBMARINES—COMMUNICATIONS.

Source: Lt. Comdrs. H. P. Leclair and C. H. Maddox, U S N., and Lieut. E. L. Nelson, U. S. N. R. F. (Continuation of Report of Rear Admiral S. S. Robison, U. S. N.)

30 December 1918.

(11222F.)

RADIO.

General. All submarines use Telefunken quenched spark direct-coupled transmitters, varying in power input from 1 to 2 kilowatts. In addition to the quenched spark gap, the converted mercantile submarines are provided with a rotary gap, the motor-generator in this case being located in the radio room. In all other cases, the motor-generator is outside the radio room. The wave-length range is from approximately 300 to 900 meters, continuously variable between those limits. The standard wave length used is 400 meters. An ordinary hand key is used for transmitting. A "break system" is not employed. All transmitting apparatus except motor generator, key and antenna loading inductance, is compactly arranged in a small cabinet. All but the older boats use a standard type of transmitter.

Receivers are of a standard type in all but the older boats. All types employ crystal detectors, have direct coupling, between primary and secondary, and use an additional direct coupling, permitting of variation, between secondary and detector circuits. Wave length range is from 170 to 6,000 meters. In two boats (*U-124* and *U-153*) an audion control box was found. In all other boats inspected there were no means of receiving continuous waves. All boats are provided with a three-stage, low frequency vacuum tube amplifier. In the *U-153* a two-stage low frequency amplifier was found in addition to the standard three-stage type.

Two antennæ are carried by all boats. The main antenna consists of two wires supported by two higned masts which vary in height on the different boats from 30 to 60 feet above the deck. The two masts, with antenna, are simultaneously raised and lowered by electric or hand power from inside the submarine. The auxiliary antenna is fixed to metal spreaders attached athwartships to the jumper wires. The latter are broken by porcelain goose-egg insulators where they pass over the conning tower, and at bow and stern. In most cases the jumper wires form part of the antenna system. Both the section aft and the section forward of the conning tower are electrically connected by a jumper in the form of a metal pipe shaped so as to pass outboard and well clear of the conning tower. There is but one entering insulator, which is used for either antenna.

Location of the radio room varies with the type of boat. It is always near the control room and in most cases built into one side of

the latter. The floor space occupied is about 22 square feet. In addition to radio apparatus, the radio room also contains the hydrophone receiver, oscillator transmitting key, motor starter and instrument board. The room is sound proofed.

RADIO DIRECTION FINDERS.

No submarines are equipped with radio direction finders or means for underwater radio reception. There is no trace of such apparatus ever having been used. The receiving equipment of only a very few boats permits reception of continuous waves. Nothing in the way of a continuous wave transmitter was found except the two audion control boxes in *U 124* and *U 153* which were apparently designed to permit of continuous wave vacuum tube transmission as well as heterodyne reception. The type of apparatus in use indicates that the development and application of the vacuum tube for reception, amplification and transmission is much behind that of the Allies and United States.

MASTS.

The two masts for supporting the main antenna are of steel, made in tubular sections of different diameters and welded together. The height of masts above superstructure deck varies on different boats from 30 to 60 feet. Both masts are offset from center-line of boat. The quadrant fixed to the heel of the mast has two chains, which pass around the quadrant. The other ends of the chains are secured to steel rods which are fastened to the ends of a chain passing around a chain grip. The latter is secured to a horizontal shaft, running athwartships to a water-tight box secured to the pressure hull, where it is geared with a vertical shaft passing into the boat. The bottom of this shaft is geared to a horizontal shaft which can be turned by hand power by means of an endless chain gear, or by electric motor when the clutch is thrown in. By this arrangement both masts are raised and lowered simultaneously from inside the boat, the masts always remaining parallel to each other. When down, the masts rest in a trough in the superstructure. They can be raised or lowered (by electric motor) in about one minute.

ANTENNAE.

The main antenna consists of two stranded cables supported by the hinged masts. The top fitting of the mast consists of a curved frame to which the antenna insulators are secured. The shape of the frame permits the two antenna wires to clear each other when the masts are lowered. In the raised position of the masts one wire is beneath and to one side of the other. At each end of each wire a helical spring is fitted, a porcelain strain insulator connecting the spring to the mast. The feeder consists of two wires from entering insulator, one

connected to each wire of the antenna. The connection is usually made at the center, midway between the masts, but in a few cases it is made to the forward end of the antenna wires.

The auxiliary antenna consists of two sections, one forward and one abaft the conning tower. Metal spreaders are secured to the jumping wires. The antenna wires are secured at either end to these spreaders. The jumping wires are insulated by glaced porcelain goose-egg insulators in the vicinity of conning tower and near their bow and stern ends. In most cases the jumper wires form part of the antenna, but in others (large cruisers) they are broken every 8 feet by porcelain goose-eggs throughout their whole length. The end of each section of the antenna nearest the conning tower is about 12 feet above the deck. The bow and stern ends are about 6 feet above deck. Each section is about 35 feet between spreaders. The two sections are electrically connected by a metal pipe, bent so as to clear the conning tower and supported only at the ends where connection is made to the metal spreaders. A lead from one of the spreaders makes connection with the lead-in at entering insulator. There is but one entering insulator, which is used by both main and auxiliary antenna, but when one antenna is in use the other is, of course, disconnected. The auxiliary antenna is connected at all times when the masts are not raised.

The entering insulator consists of white glaced porcelain with an ogival head. It is moulded with a flange which seats on a flange forming the top of the deck-tube or antenna trunk. A metal ring fits over the porcelain flange of the insulator and is bolted to the flange of deck tube, suitable gaskets being used for water tightness. In *U-164* the radio room is located forward of the conning tower and control room. In many boats the radio room is located to one side of the control room, directly beneath conning tower, in which case the antenna trunk is given a straight vertical lead directly into radio room. At the bottom of the antenna trunk, where it terminates in the radio room, a second insulator is secured inside the trunk. It is similar in shape to the entering insulator, differing only in dimensions. Near the bottom of the lower insulator a heating coil, in the form of a band, passes around its outer circumference. This consists of a few turns of metal resistance ribbon and is for the purpose of drying the insulator. In some boats an air pressure line is connected to the bottom of the antenna trunk, just above lower insulator, which permits any water that may collect in the trunk to be blown out.

RADIO ROOM.

The location of the radio room varies. In the majority of cases it is built into one side of control room. Otherwise its location (as on *U-164*) is just forward of the control room, and aft of officers' quar-

ters. Its construction is of sheet metal, sheathed inside with wood matchboard, over a layer of felt for sound proofing. The deck space usually occupied is about 22 square feet. In addition to radio apparatus the radio room contains hydrophone receiver, oscillator sending key, motor starter and instrument board.

MOTOR GENERATOR.

The standard type of motor generator consists of an inductor generator and compound wound direct current motor. The name plate on generator gives the following data: power, 2.5 k. v. a. at 160 volts 15.5 amperes, 3000 r. p. m. frequency 470/600 for speed of 2820/3600 r. p. m. The motor is 4 h. p. bipolar with interpoles, compound winding, 220 volts, normal speed 3000 r. p. m. The starting rheostat is located in radio room. Its construction is such that it also acts as a speed regulator. There is no automatic starter. The field rheostat for generator is located in radio room and is of the slide-wire type. There is a frequency meter in the radio room, and outside a D. C. Ammeter shows the current input to motor. No other switchboard instruments are provided. There are two motor-generators, both located outside the radio room, one usually in the forward torpedo compartment and the other in a compartment well aft of the radio room. In the converted mercantile cruiser *U-153* there is only one motor-generator and this is located in the radio room.

TRANSMITTER.

A standard type of transmitter is used in all but the older boats. This would be rated on the basis of power input as a 2 k. w. transmitter. The cabinet consists of three sections secured together by two wooden rods and fastened by screws to a baseboard. Looking at the cabinet from the front the left section contains the primary variometer; the middle section the transformers, condensers, spark-gap, spark-gap blower and motor, and radiation ammeter; and the right section, the secondary or antenna variometer.

The primary variometer consists of fixed and movable coils, each enclosed between fibre sheets which are sewed together. The stationary coils are in three sections, the number in circuit being controlled by the primary inductance switch at the front of the cabinet. The movable coils are connected to the stationary coils in an opposite sense, so that when interleaved the inductance of the combination is a minimum. There are three wave-length scales on the front of the primary variometer section of the cabinet corresponding to the three settings of the primary inductance switch.

The secondary or antenna variometer is similar in construction to the primary, except that it consists of a larger number of coils and there is no means of varying the number of coil sections in circuit. There are six wave-length scales on the front of the antenna vario-

meter section of the cabinet, corresponding to the six settings (0 to 5) of the antenna loading inductance switch. The antenna loading inductance is a separate piece of apparatus and is not contained in the transmitter cabinet but separately mounted on the bulkhead of radio room. The coils are enclosed in oil, inside a rectangular case, $5\frac{1}{2}'' \times 10\frac{1}{2}'' \times 16\frac{1}{2}''$. A rotary switch on top of the case varies the number of coils in circuit.

The transformer is of the closed core type, immersed in oil and contained in a metal casing.

The condensers are of copper foil with mica dielectric. The capacity of each unit is 9000 centimeters. Four units are used in series-parallel, the total capacity of the combination being therefore that of one unit (9000 cm. or 01. mfd.).

The spark-gap is of the quenching type and possesses some unusual features of design. The sparking takes place at the outer rim of the gap plates, in the open air, and *not* in an air-tight space between the central part of the gap plates, as is usual in most quenched gaps. The first gap plate can be turned on a screw threaded disc, so as to vary the width of the first gap. Across this first gap a choke coil is connected. While operating the transmitter, adjustment of this gap appeared to affect the spark tone. Its exact function, however, is not clear. The construction of the gap is such as to afford very rapid cooling and therefore efficient quenching. A centrifugal blower operated by a small electric motor assists in keeping down the temperature of the gap.

The radiation ammeter is double scale, 0–8 and 0–16, the lower scale reading being obtained by pushing a button alongside the meter.

The adjustment of the transmitter is quite simple and can be done very rapidly. It is only necessary to set the primary and secondary variometer arms to the desired wave-length shown on the scales, and the primary and antenna loading inductance switches to the point corresponding to the scales in use. The secondary variometer scale is marked for 400 meters setting for both main and auxiliary antenna. Should other wave lengths be desired, it is only necessary to set the primary as indicated by the scale and vary the secondary until the radiation ammeter gives a maximum reading, an operation that is a matter only of seconds. The wave-length range is from about 300 to 900 meters, continuously variable. The coupling between primary and secondary is direct, and the design is such that no variation of coupling is necessary. On both auxiliary and main antennae, in all boats on which the transmitter was operated, no difficulty was found in obtaining 16 amperes radiation on a wave-length of 400 meters.

RECEIVER.

A standard type of receiver is used on all recent boats. Its main features are the following: Variable direct coupling between primary and secondary; detector circuit coupled to secondary by a variable direct coupling; no inductive coupling employed between any circuits; adapted for either crystal detector or audion; detector circuit can be coupled direct to primary for "pick up" work; wave-length range 170 to 6000 meters. The receiver is contained in a wooden case 17″ long, 14″ high and 9″ deep. The primary condensor is in the lower left hand corner. In the upper left corner is the primary inductance switch. This has 18 settings marked on a white bone disc from 0 to 17. In addition to varying the primary inductance, it places the primary condensor in series of parallel according to the wave-length to be received. The variable primary condensor scale is marked in degrees and may be marked in wave-lengths corresponding to the inductance switch settings with the antenna in use. The dial below the inductance switch varies the direct coupling between detector and primary circuits. The variable secondary condensor is shown in the lower right corner. The secondary inductance switch is in the upper right corner. The variable secondary condensor is marked with four wave-length scales corresponding to the settings marked on the dial of the secondary inductance switch. Below this dial is the switch for varying the direct coupling between detector and secondary circuits. In the center of the panel the dial marked "KOPPLUNG der KREISE" varies the direct coupling between primary and secondary circuits. Above this is the switch for connecting the detector circuit direct to the primary for "pick-up" work, or to the secondary. There are two crystal detectors, each mounted in a separate hard rubber block. Between and below the two detectors the switch marked "ZELLE" connects either of the two detectors in circuit. In its middle position, marked "AUS," the detectors are both cut out of circuit, and suitable connections for using the audion detector are made.

The latter is connected into the receiver circuits by a three point plug which fits into three sockets.

The send-receive switch disconnects both crystal detectors, close to their terminals, when the switch is thrown to the "send" position. It also opens both primary and secondary circuits and connects them to ground. The handle at the left side of the receiver is mounted on a horizontal shaft passing through the receiver to the right side, its rotation performing the various switching operations. Mounted on the shaft near the handle are two sprocket wheels. A length of chain passes around one of these, to the ends of which two flexible stranded steel wires are connected. These pass over small pulleys to the ends of a similar chain fitting around a similar sprocket, fitted to the end

of the shaft of a switch box which contains the rotating knife switches for cutting in and out the generator field, spark-gap blower-motor circuit, etc. The other sprocket wheel near the send-receive switch handle operates, by the same sort of arrangement, the antenna transfer switch. Hence the movement of the send-receive switch handle on the receiver performs all the switching operations necessary in changing from sending to receiving. On a great many boats, however, no antenna transfer switch was fitted, the transfer of the antenna from transmitter to receiver lead being done by unplugging the antenna lead from one socket and plugging it into the other.

The interior is divided into two compartments by a longitudinal panel, on either side of which the various coils are secured. The interior wiring and switching arrangements are exceedingly complicated. Apparently this receiver is an efficient one for the reception of damped waves over the long range covered, 170 to 6000 meters. But for heterodyne reception of undamped waves it would probably not be found satisfactory. Various types of U. S. Navy receivers are considered much superior.

AUDION.

Only two of the submarines inspected were found equipped with audions. The apparatus was apparently designed for either transmitting or receiving. In either case two vacuum tubes are employed in parallel. Above this is the dial of rheostat for controlling filament current when receiving. To the right of this is the filament current ammeter and to the left a radiation ammeter. The sockets at the right are for plugging in the transmitting key. The vacuum tubes are of the usual three element type. The arrangement of circuits does not differ materially from those already known. It is doubtful that this apparatus has been used for transmitting and in the two boats on which it was found the transmitting circuit was not connected completely. It would be necessary to employ the tuned circuits of the receiver in order to effect transmission and this method would be very inefficient. The plate voltage for the tubes is furnished by a dry battery containing 81 units, giving a maximum of 81 volts. The filament battery is a 6-volt 3-cell accumulator.

THREE-STAGE AMPLIFIER.

A standard type of three-stage vacuum tube low frequency amplifier was found in all submarines. It is contained in a metal case 11 inches high, $11\frac{1}{4}$ inches long and $3\frac{3}{4}$ inches deep. The telephone receivers are plugged into either pair of sockets marked "FERNHORER" to obtain the three stages of amplification and into the sockets marked "UNVERSTARKT" when no amplification is desired. To the left of each tube is shown a fine wire enclosed in a

small glass tube with brass knife terminals which fit into clips. This is apparently a ballast resistance in series with the filament of vacuum tube. On each of these resistance tubes the filament current of the vacuum tube with which it is to be used is marked and the extra resistance is evidently intended to compensate for any lack of uniformity in the resistance of vacuum tube filament. It is also probable that the fine wire resistance acts as a protective fuse against excessive filament current. The filament current rheostat is mounted as a separate piece of apparatus. A 6-volt accumulator furnishes the filament current and a dry battery of 81 units the plate voltage.

Three iron core transformers, enclosed in metal cases which are grounded through the negative filament lead, are employed. The telephone receivers are connected to the third stage through a small telephone transformer. The arrangement of circuits conforms to the usual practice in amplifiers except that a bridging condenser of 1–5 mfd. is connected across the plate voltage battery and a condenser of 1000 cm. is connected between the grid and positive side of the filament in the second stage.

The vacuum tubes employed are similar in appearance and arrangement of filament, grid, and plate to the well known "French" valve. The glass tube, however, is tubular in shape instead of globular.

This amplifier is used with either the radio or hydrophone receiver.

TWO-STAGE AMPLIFIER.

This type of amplifier was found on only one submarine. It is for low frequency amplification. Two vacuum tubes with two ballast resistances in the filaments as in the three-stage type, and two iron core transformers are employed. There is no telephone receiver transformer and no condensers are used. The case is metal, 12 inches long 10 inches high and 4 inches deep. A switch connects the input leads direct to the telephone receiver terminals when amplification is not desired. This amplifier appears to be almost identical with the U. S. Navy type S. E. 1000.

The vacuum tubes found in this amplifier differ in regard to shape and arrangement of their elements from any others found. The plate is in the form of a horizontal disc; parallel and just above this, the grid in the form of a spiral, similar to the hair spring of a watch, is supported horizontally. The tubes are mounted vertically, as are the vacuum tubes of all apparatus inspected. Filament current is furnished by a 6-volt accumulator and the plate voltage by an 80-volt dry battery.

AVIATION.

AVIATION EXPERIMENTS.

Source: Weekly Report of Aviation.

31 March 1919.

During the past week experimental night flying has been conducted to further test various night landing devices.

An F-5 plane was equipped with Holt's wing tip flare. It was installed on the underside of the nose of the boat and so arranged that the observer in the front cockpit was able to reload and connect it up as many times as desired. One flare was ignited and used in taking off. The plane was flown and communication was carried on with one of the war ships by blinker, merely as an experiment. The plane was landed successfully. It was again taken off but the flare that had been ignited for landing had burned out. A second successful landing was made about twenty minutes later, using the flare again, as it had in the meantime been reloaded in the air. The experiment was considered quite successful.

Another type of landing device was installed on this same plane and tried out at the same time. It consisted of two lamps mounted some distance apart on the upper wing surface, and so set that the beams of the two lights would converge on the surface of the water, when the plane had descended to a point of twenty feet above the water. This device was not considered practical due to the fact that it is desirable that the whole surface of the water, beneath the boat about to land, be well illuminated to show up any obstructions.

On Sunday, March 23rd, a plane left on an endurance test with geared down high compression Liberty Motors. The plane had a gas capacity for 26 hours and it was hoped to make a continuous flight for this length of time. After six hours in the air the gears of the port motor gave way completely, causing a forced landing. The motor showed remarkable fuel economy, having consumed 223 gallons in 6 hours, or 37 gallons per hour. The plane was heavily overloaded. It is intended to conduct another endurance run in the near future, using straight drive high compression motors.

ITALIAN ANTI-AIRCRAFT FIRE-CONTROL.

Source: Reliable.

11 February 1919.

(8402.)

During an inspection of the Italian proving ground at Nettuno a new system of anti-aircraft fire control was seen and a considerable amount of descriptive matter of the apparatus and of the course of studies for students in the anti-aircraft school for officers was secured. The essential feature of this method is that the angle of sight, the azimuth and the distance of an aircraft are read simultaneously by three observers from appropriate instruments at regular intervals of time and are plotted against time on three pieces of cross-section paper by three operators. At a given signal, each operator draws a curve through his points and prolongs it so as to allow for the future position of the aircraft. The data for the gun are then read and the proper commands issued to the gun. This system operates very quickly and is a good method of determining the future position of the aircraft without any assumption of constant height.

Designs have been perfected for an electrical device for carrying these same data to the gun automatically and thus saving some ten seconds in its operation. The opinion was expressed that in future anti-aircraft shell will be used to the exclusion of shrapnel. The standard guns will be high-power guns of calibers 105 mm. and 67 mm. on fixed mounts, while rapid fire one pounders will be used on auto trucks for work against low flying machines.

An apparatus was chosen for detecting approaching airplanes by the increase in pitch of the sound of the engine when it is approaching and the corresponding decrease when it is departing (the Doppler effect). The apparatus consists, in principle, of a mouth organ whose notes are compared by the ear with those of the airplane.

A sort of trumpet was also exhibited, to be carried by the Italian airplanes and operated by a small fan which gives out a note which can be heard from a distance of 15 kilometers. This serves the important purposes of distinguishing friendly from enemy airplanes. The note can be changed at will so as to conform to the pitch which has been adopted for a given day and the sound can be used to send dot and dash signals.

The sights on the guns and the other optical apparatus seemed to be very admirable from the point of view of workmanship. Plans have been made for an improved anti-aircraft sighting apparatus which corrects for the errors due to the fact that it is not parallel to the bore of the gun. It is a further development of the sighting apparatus in use on the Italian auto-truck mounts. The officers at Nettuno are very enthusiastic about this sighting apparatus and consider that it is very much better than any others.

ROYAL NAVAL AIR SERVICE—OPERATIONS DURING THE WAR.

Source: British.

25 January 1919.

(11294.)

The importance of aviation to the Royal Navy was recognised as far back as 1909, when attention was first devoted to rigid airships by constructing one large dirigible. Experiments with seaplanes and aeroplanes commenced in 1910. In 1912 the Admiralty created an Air Department and pressed forward the construction of aeroplanes, seaplanes and small cruising airships.

On the outbreak of war the Royal Naval Air Service possessed 93 machines of various types, of which only about 50 were usable. The growth in strength is shown in the following table:—

August 1914, 93 aeroplanes and seaplanes.
January 1915, 181 aeroplanes and seaplanes.
January 1916, 1031 aeroplanes and seaplanes.
January 1917, 1599 aeroplanes and seaplanes.
January 1918, 2851 aeroplanes and seaplanes.
April 1918, 2949 aeroplanes and seaplanes.

On the outbreak of the war the personnel of the R. N. A. S. consisted of approximately 50 officers and 500 ratings. The following table shows the growth of the personnel as from the 15th August 1914 until the fusion of the R. N. A. S. and the R. F. C. on the 1st of April 1918:

Personnel of the R. N. A. S.

Date of return.	Officers.	Men.	Total.
15th August 1914	138	589	727
15th December 1914	476	3,769	4,245
15th June 1915	1,063	7,192	8,255
15th December 1915	1,634	11,041	12,675
15th June 1916	2,135	17,367	19,502
15th December 1916	2,764	26,129	28,893
15th June 1917	3,441	30,679	34,120
15th December 1917	4,675	43,050	47,715
15th March 1918	5,378	49,688	55,066

Work with the Grand Fleet has been useful rather than spectacular. The principle of flying aeroplanes off the turret or decks of ships has been steadily developed, which enables flights to be made in weather which would preclude the use of seaplanes.

A number of light cruisers are fitted to carry single seater aeroplanes, whose role is to attack enemy aircraft and to defend our own reconnaissance and spotting machines. It was only recently that a pilot in a Camel Scout—flown from a lighter—destroyed a Zeppelin in the North Sea.

OPERATIONS IN FOREIGN WATERS AND COUNTRIES.

The operations of the Royal Naval Air Service in foreign waters and countries have been of such a world wide nature that it is impossible in a paper of this description to attempt to give full details or to follow any chronological order. Seaplane and aeroplane stations have been established at Dunkirk, Fecamp, Cherbourg, Gibraltar, Malta, Taranto and Otranto (Italy), Mudros, Skyros, Thasos, Stavros, Imbros, Mytilene, Suda Bay, Syra, Port Said, Alexandria, Zanzibar, etc., whilst special expeditions have been carried out from time to time.

Special mention may be made of the assistance given to the Belgians of Lake Tanganyika; the operations by aircraft which contributed to the destruction of the *Königsberg* in July of 1915; and the operations in Mesopotamia during which the garrison cut off at Kut were fed by parcels dropped from aircraft.

Excellent work was accomplished in the Dardanelles, prominent among which was the destruction of three ships by torpedoes dropped from aircraft; and the accurate location of the forts of the Dardanelles—in the absence of correct charts—by aerial photographic reconnaissance. Frequent bombing raids on Constantinople and other objects of military value in this area; the attempt to destroy the *Goeben* while that ship was aground; and the constant patrol of the Dardanelles up to the time when Turkey asked for an armistice may also be mentioned in this connection.

Machines were loaned to the Union Government to assist in the operations in these parts.

The station formed at Zanzibar accomplished good work from its inception until the disbandment early this year.

Naval Air contingents worked on the left flank of the Palestine Army and operated in the Red Sea against the enemy communication line to Aden and in support of friendly tribes.

A wing was formed in Italy in the early part of 1917, the duties of which consisted of assisting on the Otranto barrage and the bombing of the Austrian Naval ports of Pola, Cattaro and Durazzo—leading up to the capture of the latter just recently—and assisting the Italians in their Albanian Campaign.

Anti-submarine and escort convoy work has been carried out continuously from these stations and has undoubtedly materially assisted in combating the submarine menace in these waters.

During the latter part of 1914 the work of the Dover-Dunkirk Squadrons consisted chiefly of conveying transports.

Bomb dropping on enemy objectives was carried out periodically from the early days of the war but in 1915–1916 the numbers and types of machines available were such that the effect on the enemy

was negligible. In 1915, however, among the most outstanding results of other work was the destroying of a Zeppelin by Flight Sub-Lieutenant Warneford, V. C.—the first instance of a Zeppelin being brought down by aircraft—the commencement of submarine patrols on land machines, two big raids on Zeebrugge from Dover, and several raids on the Brussels Zeppelin sheds, one shed being hit. The organization consisted of four groups of 12 machines each, the types being Avro, Henri, Voisin, Morance monoplanes, Nieuport and twin-engined Caudron.

In 1916 night flying was developed and regular anti-Zeppelin patrols and night bombing on the Belgian coast commenced. Aerobatics came in for close attention and the first fighter squadron, formed in June of this year, kept up a continuous patrol between Dixmude, Nieuport, and Ostend for the protection of the French and Belgian spotting machines. Also, at about the last mentioned date the first heavy bombing machine—a short land machine with 250 H. P. Rolls Royce engine—which was the prototype of the present heavy night bomber, operated from Coudekerque. The organization at the time consisted of three wings, from which units were taken and a squadron formed, and lent to the R. F. C.

It was during 1917 that the activities of the Dover-Dunkirk squadrons greatly developed and at varying times squadrons Nos. 1, 3, 6, 8, and 9 operated with the R. F. C., usually four of these squadrons being lent at a time.

The wastage of Naval pilots—and consequent replacements—not having been so heavy as in the case of R. F. C. pilots, it was possible to give the former a much more highly specialized training. As a result of this, and their greater experience, the Naval Squadrons made their presence felt appreciably on the Army front, until by continuous fighting their losses were sufficient to reduce their high standard.

In the middle of February a squadron of Sopwith triplanes proceeded to the Somme, followed a little later by a squadron of Nieuport Scouts. Still later 2 more squadrons of triplanes proceeded to the Somme front, and, in co-operation with R. F. C., took an active part in the renewed Somme offensive at the end of March, in the Arras battle and later in the Messines and Ypres battles. Extremely intense air fighting took place, and at the Ypres battle firing at trenched and other ground targets was a feature—casualties being very heavy.

Among other activities during this period may be mentioned the cutting off of enemy machines on their way back from bombing London; concentrated night and day attacks on enemy aerodromes—

the last mentioned being used by the enemy for their long distance bombing machines; and escorting shipping and feeding the Belgians.

It is interesting to note that in June of 1917 the first Handley-Page heavy night bombers proceeded to Coudekerque to replace the single-engined Short bombers. The first occasion on which Handley-Page machines went on coast patrol they bombed and sunk one of four German destroyers. During the numerous raids carried out in 1917 a total of 334 tons of bombs was dropped by the Dover-Dunkirk squadrons.

The Dover-Dunkirk squadrons reached their maximum of strength in 1918. The fighting squadrons having been rested were at their very best—with very experienced pilots—when the German offensive in March started. The transference of the whole of this valuable unit to the battle front, with the exception of Nos. 213 and 217 squadrons, made an effective contribution to the preponderance of the British Flying Service on the Western front. The naval squadrons took their full part in the low bombing (day and night) and in engaging ground units by scout machines which had such a large share in arresting the German offensive.

It was owing to the large amount of photographic preparation for the Zeebrugge and Ostend blocking operations that these operations became possible.

In the actual attack on Zeebrugge and Ostend, aircraft were to have co-operated, but owing to thick mist and rain it was quite impossible to get off the ground. In the earlier attempt to block these two ports, the aircraft carried out their operations according to program but the surface craft were withdrawn, owing to adverse weather conditions before making the attack.

In coastal operations since April 1st, 1918—on which date "No. 5 Group" was assigned as the official title of the Dover-Dunkirk Squadrons—174 enemy aircraft have been destroyed and 163 driven down out of control, whilst one kite balloon was destroyed which, falling in flames on kite balloon sheds, set alight to and destroyed them all. Squadrons working with the army up to March 12th accounted for 11 enemy machines on our side of the lines and 163 on the enemy side, whilst 289 were driven down completely out of control and 43 driven down damaged.

One of the results of these continuous night bombing attacks was to cause the enemy destroyers to put to sea at night and anchor off Zeebrugge Mole. On this fact being observed by aircraft, a combined attack by aircraft and motor boats on the 7th April—which was completely successful—was carried out. The aircraft attracting

the attention of the enemy by bombing Zeebrugge Mole enabled the Coastal Motor boats to attack and sink one destroyer and severely damage a second.

The bombing of enemy aerodromes by these squadrons has probably been far more successful than is generally recognized, and one prisoner stated that, on three occasions, raids on England had to be abandoned owing to the damage caused to enemy machines at St. Denis Westrem, whilst on another occasion a big shed was set on fire, and subsequent reports showed that 18 machines inside were entirely destroyed.

The continual operations against the enemy bases on the Belgian coast—and the assistance given in the Belgian Army offensive—is specially notable, and during the six months ending September 1918, 600 tons of bombs were dropped by aircraft on objects of military importance, concentration of troops, railways, etc.

There is very little doubt also that the continuous bombing of the Belgian coast very materially interfered with the work in the enemy naval bases, submarine building yards, factories, etc.

The carrying of aircraft in specially reconstructed ships has been a marked feature of R. N. A. S. work since the early days of the war. H. M. S. *Ark Royal* was closely associated in the Dardanelles operations in bombing spotting for the Fleet, photographic reconnaissance, etc. This vessel has remained in commission—chiefly in those waters—right up to the cessation of hostilities. H. M. S. *Ben-my-Chree* provided the machines which accomplished such excellent work from the East Indies Station—she was eventually sunk by enemy gunfire. In all there were 12 aircraft carriers, all of which have contributed their quota towards harassing our enemies in various parts of the world, the most recent example being the operations carried out by seaplanes—very largely overland—flown from H. M. S. *Nairana* in the White Sea.

No less than 89 per cent of the total seaplanes and 66 per cent of the aeroplanes engaged in anti-submarine, convoy and sea reconnaissance work, and 100 per cent of airships have been fitted with standard wireless sets, the continuous wave apparatus weighing 90 pounds, giving a transmitted range of 400 miles and a receiving range of 200 miles, whilst the spark apparatus—weighing approximately the same—gives a range of 120 miles either way.

Summary of anti-submarine work carried out by airships.

	Number of ships.	Number of patrols.	Time. Hrs.	Time. Mins.	Distance miles.	Escorts.	Mines sighted.	Mines destroyed.	Submarines sighted.	Submarines attacked.	Remarks.
1917.											
June	40	364	1,808	0	49,645	46	.....	.....	1	1	
July	47	407	2,243	6	65,156	59	6	3	2	.....	210 merchant ships convoyed.
August	39	243	1,128	40	33,219	33	1	.....	2	2	
September	47	543	3,116	39	87,510	86	2	1	7	3	
October	47	284	1,479	20	39,592	44	3	1	4	2	
November	47	400	2,216	28	62,899	63	3	2	5	3	
December	43	361	1,934	11	53,608	59	2	1	5	5	
1918.											
January	43	174	832	25	22,454	47	3	1	1	1	
February	37	268	1,416	11	37,484	37	2	1	1	.....	
March	51	602	4,054	54	106,756	132	11	6	3	1	
April	63	599	4,290	13	111,227	184	7	4	1	5	
May	72	1,115	8,373	0	198,579	269	30	30	5	3	By airship gunfire; 9 turned over to sea craft for destruction.
June	72	688	5,082	11	117,432	170	12	6	3	2	
July	74	524	3,761	43	83,929	179	12	4	2	.....	
August	78	1,239	8,991	0	212,030	454	15	7	3	2	
September	78	495	2,760	16	68,419	144	6	4	1	.....	
October	80	753	6,215	15	146,077	204	19	2	3	1	
Total	[1] 56	9,059	59,703	32	1,496,016	2,210	134	73	49	31	

[1] Average.

KITE BALLOONS.

The question of the employment of kite balloons with the Grand Fleet first received attention in June, 1915, and towing trials were carried out with the now obsolete "Drachen" type balloon. This balloon proved unsuitable for mobile work, and it became evident that much research work was necessary before a balloon could be produced capable of withstanding the heavy towing strains imposed upon it by a moving ship.

Experimental work on balloon designs was made with the result that a type has been evolved capable of long endurance, and of flying in wind speed up to 80 knots.

The progress and development in the design and construction of kite balloons during the last two years has been very marked, and the modern type—for the original design of which we are indebted to the French—is now in general use in the Grand Fleet for reconnaissance and observation, and is also employed on a large scale for anti-submarine operations, both in Home Waters and in the Mediterranean.

No opportunity has been afforded of testing their efficiency in a fleet action, although they are always carried when the Fleet proceeds to sea.

In anti-submarine operations it is realized that their functions are defensive rather than offensive, but that the balloon acts as a deterrent to the hostile submarine is admitted, since no ship carrying a

balloon has ever been torpedoed, and convoys escorted by balloons have been singularly immune from attack.

The value of the kite balloon in minesweeping operations is fully realized and a considerable number will be employed in this service at an early date.

The expansion of kite balloon activity for Naval purposes had developed considerably by the early part of 1917 after the French Caquot Balloon had been acquired and adapted for seawork.

The number of stations at present formed are ten with two substations and two training stations in Home Waters, and in the Mediterranean seven stations, and a further increase is approved.

Naval balloons are now employed in the following operations:—

1. Anti-submarine barrage, e. g. Otranto Barrage, the Northern Barrage, the Dover Barrage.

2. Protection of convoys both in Home Waters and in the Mediterranean.

3. Offensive patrols and the reduction of submarine activity in particular localities.

Provision is made for flag ships and second ships of divisions of the battle cruiser fleets to carry balloons, and also for a number of light cruisers and destroyers of the Grand Fleet.

For anti-submarine operations 108 vessels of various classes for service in Home Waters and 76 for service in the Mediterranean are fitted with winches, or approved to be fitted.

For service with the Grand Fleet 22 capital ships, 7 light cruisers and 23 destroyers are fitted, making a total of 247 vessels.

In the summer of the present year the total number of working balloons was 163 and further expansion has been provided for in the Program of 1919.

In April, 1915, kite balloon personnel consisted of 30 officers and 300 ratings. In April 1918, when the R. N. A. S. became amalgamated with the R. F. C. under the title of Royal Air Force, the numbers had increased to 500 officers and 4,435 men.

The details of the work accomplished so far as available records show are as follows:—

Patrols	586
Escorts	113
Hours in the air	37,012
Miles	368,800

These figures cover the years 1917/8.

ENGINEERING.

GERMAN SUBMARINES—ELECTRIC EQUIPMENT

Source: Commander C. S. McDowell, U. S. N., and Lieut. Commanders A. C. Dibrell and F. T. Leighton, U. S. N.—(Continuation of Rear Admiral S. S. Robison's Report.)

30 December 1918.

(11222E.)

STORAGE BATTERIES.

The storage battery plant of the *U–164* and *U–124* consists of two batteries—each containing 124 cells giving approximately 220 volts for each battery. These batteries are named battery one and two, battery one being aftermost just forward of the control room. The batteries are normally connected up in parallel although either battery may be used separately. There is no connection for placing the two batteries in series. There is a connection from the middle half of each battery to the main motor switchboard so that one half of the total battery voltage (approximately 110 volts) may be obtained on main motors. Each battery is installed in a separate watertight compartment. Each cell is individually ventilated and supplied with suitable openings for filling, and obtaining of electrolysis samples for hydrometer tests.

There are double separators between plates consisting of a corrugated perforated hard-rubber separator and a wooden separator. In addition, there are vertical hard rubber pins which slip down in the corrugations of the rubber separators to prevent them from collapsing. The cells are very inaccessible, only the center rows are capable of removal without disarranging adjacent cells, and the extreme outboard cells are capable of only the most casual examination. Separate electrical connections are taken from each battery to the switchboards. The main battery fuses are installed in compartments directly over battery, there being fuses on the positive and neutral leads and a circuit-breaker on the negative lead. The plates are of the lead-pasted type. The grids of the positive plates are apparently cast in two sections and joined together at the top and bottom, leaving a narrow vertical slot in the plate. The negative plates are cast whole. The battery jars are of some tar compound, possibly sum-

mite. All the positive plates are burned to a positive buss bar and all negative plates to a negative buss bar.

Ventilation headers of a tar compound run fore and aft between the rows of cells, there being six or more headers to each battery; each cell is connected to the header by a soft-rubber connection with a glass tube projecting through cell cover. Suitable inlets are provided in each cell for supplying air from the free space above the cells. The ventilation system of the batteries is part of the main boat ventilation. For applying air to the battery, inlet pipes are fitted, two to four branches on each side of the battery compartment, all coming up to a common duct which leads overhead, with an opening adjacent to an outlet from the main supply duct of the boat, so that when the starboard or supply ventilation system is in operation fresh air is blown directly into the battery inlet pipe. The exhaust headers under the battery deck are connected to the port ventilating system of the boat, the lead from these headers coming out at the opposite end from the battery supply inlets, and at the same end as the battery terminals.

The steel battery tanks are not lined; they are painted with a heavy coat of acid-resisting paint.

The battery jars are about 18 inches above the bilge, carried by fore and aft metal stringers, from which the jars are insulated by some tar compound corrugated insulators. The battery compartment may be flooded from sea and may be pumped by bilge pumps. Arrangements are also provided for washing out with soda. It appears from the inaccessibility of the jars and the fact that lead lining is not used, that the jars must be very rugged and that breakage is a rarity.

Neither spare cells nor spare plates were found on any of the submarines examined.

The storage battery plants of the *UB–149* and the *UC–105* are in general similar to that described above, except that the two batteries on these vessels are of 62 cells each; and, while in the *U–164* and *U–124* the batteries are all forward of the control room, in the *UB–149* and *UC–105* No. II battery is forward of the control room and No. I battery is between control room and engine room, the location on these submarines being similar to that in our *L*, *O*, and *R* classes.

MAIN MOTORS.

Main motors on all the later submarines consist of two separate motors on each side, totally enclosed, externally ventilated; each motor is separately excited with commutating poles and in many cases with compensating windings; they have a range of speed adjustment from about 70 R. P. M., when running motors in series

on half battery to about 300 R. P. M., when running with motors in parallel on full battery. Motors on each side are capable of being run as a motor generator set taking constant potential from shore and boosting voltage for charging batteries.

In the cruiser type of straight *U* boats (*135–139–141* for example) an auxiliary charging plant is installed. In the case of the *U–136* this consists of two separate oil engine driven generators, while on the *139* and *141* there is only one auxiliary generating set. In these boats the main motors are directly connected to the tail shaft without an intervening clutch so that the main motors can only be used for charging batteries when running on the surface. Power may be taken from the auxiliary generating set to the main motors, thus obtaining an electric driven connection for augmenting power supplied from the main oil engines or for driving the boat when main engines are cut out.

The batteries may also be floated on the line when running on main engine.

AUXILIARY MOTORS.

Auxiliary motors are shunt wound with interpoles in all larger size motors and, with controlling appliances located throughout the boat, in all later submarines, are enclosed type self-ventilating. The auxiliary motors are secured directly to bulkheads or bracket supports with no vibration absorbing mounting except in the case of the interior communication motor generators. These latter motor generators, which are in constant use, are mounted on spring supports, two heavy steel coil springs on each side and two similar supporting springs on the bottom. Practically all motors have ammeters mounted adjacent to them and all auxiliary motors may be connected to either main battery.

FIXTURES.

The fixtures consist of porcelain sockets with water-tight globes for all permanent lights. Bunk lights and portables consist of a plugged-in connection; two pronged type insulating material of summite or some similar compound with water-tight spring loaded flap cover when not in use. Water-tight rotary snap switches are provided for all lights—insulating material apparently summite.

OUTLETS FOR WIGWAG AND RUNNING LIGHTS.

Stern lights and side lights are installed permanently in place with water-tight pressure globes. The lenses are clear, not water-tight, with colored slides inserted behind them; these lights may be switched on either from the conning tower or the control room, with colored pilot lamp at switch (similar to light controller) to show whether light is burning. Masthead light, searchlight, and signal

lights are plugged in conning tower with portable leads running through conning tower hatch, all lights being portable. The masthead light and signal lights may be turned on from conning tower or control room, and pilot lamps are installed to show whether burning. The masthead light has a dimmer switch by which it may be turned on dim, half bright, or full bright. There is a signalling key in conning tower for use with the signal lights. The masthead light is secured by portable straps to the top of the forward conning tower periscope.

SEARCHLIGHTS.

One Siemen-Schuckert portable signalling searchlight, 14½ inches diameter mirror, is supplied on each submarine. It is the ordinary straight carbon type searchlight (carbons are not rotated) and is equipped with mechanical quick closing signalling shutter. The searchlight is mounted in socket on rail of the bridge. Positive carbons are 22x135 mm., negative carbons are 15¼x135 mm. Carbons are cored.

HEATING PLANT.

Both electric and steam heaters are fitted. Heating coils are placed throughout the boat with electric heaters in officers' quarters, conning tower, control room, mine rooms, and torpedo rooms. Electric heaters are of convector type with German silver coils either wound spirally on porcelain vertical rods or with vertical ribbon held by porcelain spools at top and bottom. These are all of single heat type, controlled by snap switch on heater circuit.

SWITCHBOARDS.

(*a*) *Panels.*—No slate or other insulating panels are used. Switchboards are made up of angle bar construction with buss bars, switches, circuitbreakers, etc., mounted on them with impregnated wood, fibre board or summite insulators. All auxiliary panels have rotary switches with handles projecting through the front, the front consisting of sheet iron. Some of the main switch boards have portable sheet iron front covers, while others are open; in no case is the front of the board alive. Main switchboards are mounted directly over the main motors and there is no distant control from the control room or other compartment. Auxiliary switchboards are mounted in various locations throughout the boat.

All fuses except main battery fuses and, in some cases, main motor fuses are of socket type indicating, with renewable porcelain plugs. Socket type fuses up to 600 amps. were seen.

Circuit breakers are provided on the negative lead on each battery and the main motor switchboard in one armature lead for each meter.

(*b*) *Ampere hour meters.*—Ampere hour meters showing the input and output of each battery are installed in the main motor room. These are of electrolytic type. They were checked when charging batteries and appear to be very reliable. They are mounted on spring supports.

(*c*) *Switches.*—Both contactor and knife blade type of main control are used. In the majority of submarines, knife switches only are installed and in all cases the controllers for main motors are mounted on the switchboard above the motors, there being no remote control of main motors. On the *U–124*, two steps of starting resistance are used, while on the *U–164* and in most of the submarines, only one step is used; the resistance cannot be left in for continuous operation.

(*d*) *Heater Circuit.*—Heater circuits lead from auxiliary switchboards with plug-in connection to electric heaters, electric heaters being portable. Snap switches are installed adjacent to plug-in sockets.

(*e*) *Lighting, searchlights, auxiliary power, electric cooker, and heating circuits.*—All light, searchlight, auxiliary power, electric cookers, and heating circuits are arranged for operation from either battery or from current obtained from either generator, with battery floating on the line. The light circuits are fitted with dimmers to enable proper voltage, using 220 volt lamps on larger submarines and 110 volt lamps on *UB* and *UC* boats. A separate motor generator is supplied in some of later submarines (*U–124* of those examined) for supplying current to searchlight circuit.

(*f*) No individual voltage leads are installed; voltage of individual cells is obtained from the use of a portable voltmeter (scale reading from 0 to 3 volts in either direction) used in connection with two pointed rods with insulated handles.

(*g*) Resistances are compact and apparently satisfactory. Main armature resistances are of cast iron grid type; other resistances are generally German silver wire wound spirally on vertical porcelain tubes.

(*h*) Slate or other insulated material panels are not used.

(*i*) *Buss bars and contacts.*—All buss bars are of copper; the arrangement of buss bars and wiring on the board is readily accessible from the front by removing the front covers. Buss bars on main switchboards are normally painted blue, red, grey, or yellow, to indicate positive, negative, neutral or machine leads respectively.

(*j*) *Wiring and connections.*—Small wiring on rear of switchboard is cotton covered wire clamped to impregnated wood strips.

(*k*) *Name plates.*—Every piece of apparatus on the front of the main switchboard and all auxiliary boards is marked with name

plate. There are name plates on the different switches throughout the boat, giving the circuit number; similar name plates with circuit numbers are on the fuse boxes and auxiliary switchboards but the cables themselves are not marked, so that it is difficult to trace out circuits.

CONDUIT.

Conduit is not used except for leads through pressure hull.

INSTALLATION OF WIRING.

All conductors entering water tight appliances or terminal boards enter through stuffing tubes. Electric leads passing through water tight strong bulkheads between compartments have stuffing tube gland on each side of bulkhead but no conduit is used through bulkhead. All leads are open work and are held by metal strips to the sides of bulkheads or to metal plates. As a rule wires are painted to match their surroundings, although in numerous cases bare steel outer braid wire is seen. Practically all wiring is leaded and armored. The portable wiring is practically all covered with woven cord—similar in appearance to leaded and armored cable.

INCANDESCENT LAMPS.

Incandescent lamps are used marked "Kaiserlich-Marine," which have a Tungsten filament. Also many 220 volt "Osram" lamps were seen. Portables as well as portable lights are used on the larger boats of 220 volts. They have a pressed fibre base; the usual rating is 40 watts.

SPECIAL OUTLETS.

Special outlets are installed in the various compartments and conning tower for plugging in portables and for electric heaters. There are special outlets for signal lights, masthead, anchor, and searchlights in the conning tower.

STOWAGE.

Main water spares are stowed behind switchboards and in bins underneath switchboards in the motor room; spare parts for auxiliary motors are stowed where possible around the boat and in compartment beneath control room and in torpedo room. Spare part boxes contain list of contents and each compartment in box is numbered.

MEANS OF COMMUNICATION.

Following means of communication are provided:

Interior.

(*a*) Voice tubes.
(*b*) Torpedo telegraph.
(*c*) Telephone system.

(*d*) Gyro compass system.
(*e*) Rudder indicator system.
(*f*) Rudder telegraph system.
(*g*) Engine room and motor room telegraph.
(*h*) Revolution indicator system.
(*i*) Main kingston indicating lights.
(*j*) Electric torpedo firing system.
(*k*) Magnetic compass reflector system.
(*l*) General alarm.

Exterior.

(*m*) Submarine signalling system.
(*n*) Marker buoy (no telephone).
(*o*) Searchlight.
(*p*) Signal light.
(*q*) Radio.
(*r*) Telephones.
(*s*) Recognition signal pistol.

(a) Voice Tubes.

Voice tubes are installed from conning tower to control room, torpedo room, engine room, motor room, and after steering room. This tube is about 1½ inches diameter. Although they appear good in operation when main engines are shut down, considerable difficulty is experienced in talking over them when main engines are running. The tubes are efficient for two reasons: there are no outlets or branches in the tubes—there is a separate tube going to each station—and the tubes are insulated from the hull by lagging which is held on by wire gauze. There is a whistle flap at the end of each tube and a colored indicating flap which flies up when the tube is blown through; thus showing the tube to be answered.

(b) Torpedo Telegraph.

There is a torpedo telegraph in conning tower to each of the torpedo tubes on the vessel. Power for this system is supplied by interior communication motor generator. In the four vessels which we particularly examined this interior communication system was 50 cycle 50 volt A. C., the generator being 220 volts and transformers installed for stepping down voltage. The dial of this telegraph is marked with the preliminary orders to be given for firing torpedo, such as angle setting, depth, etc. Each telegraph is a combined transmitter and indicator with a double pointer. A buzzer is installed in the system which keeps ringing until the message transmitted is answered back.

(c) Telephone System.

On the four types of boats which were given detailed examination telephones were installed leading from the compartments in the vessel through the hull only. There were plugged in connections on the outside of the hull, which it is presumed is for salvage purpose or for talking from the interior of the boat to the guns and mine laying stations, and for connecting up to shore when alongside the dock, for use when charging batteries, etc.

On the large cruiser submarines, interior communication telephone sets are installed with push button control for communication between the various compartments of the vessel. The receivers in all cases are of the hand type with transmitter and receiver on the same hand piece.

(d) Gyro Compass System.

The Anschutz gyro compass is installed on all vessels. The master compass has an additional gyro installed on top of it, with a wheel revolving in a horizontal plane to cut out roll, acting thus as a stabilizer. The master compass in all cases is placed in the control room adjacent to the steering station. It will be noted that there are two dials, one inside the other so that accurate reading within a fraction of a degree is obtained. In running these submarines from Harwich to Portland the gyro compass operated very satisfactorily and apparently was accurate. The gyro compass repeater in the conning tower is portable and can be taken to the chariot bridge with leads through the conning tower hatch. The motor generators for gyro compass are placed in the auxiliary motor room on the *U–124* and *U–164*. The switchboard is placed between the control room and officers' quarters, while the contactor box for transmission to repeaters is adjacent to the master compass in the control room.

(e) Rudder Indicator System.

There are rudder angle indicators, for both steering rudder and hydroplanes, in the conning tower, control room, and at rudder motors (or auxiliary control position). These rudder indicators are self-illuminated. This system obtains power from the interior communication motor generator.

(f) Rudder Telegraph System.

There is a rudder telegraph from conning tower and control room to the auxiliary rudder control station. This station system is energized from the interior communication motor generator with transformers and its operation is similar in all respects to the motor room telegraph. There is a switch in control room to connect either conning tower or control room transmitter. The buzzer keeps ringing both at transmitter and receiver until signal is answered back.

(g) Engine Room and Motor Room Telegraph.

There is a combined telegraph transmitter and indicator in conning tower and control room to engine room and motor room, with a switch in control room for connecting to conning tower or control room. There is a switch to connect to either engine room or motor room or to both. When signal is sent bell rings in engine room and motor room and continues until signal is answered. Buzzer rings in control room and conning tower until transmitted signal is answered. This system is energized from the interior communication set.

(h) Revolution Indicator System.

Revolution indicators for each engine are installed in the conning tower, control room, engine room, and motor room. These are voltmeter type energized by small motor driven by gears or rope drive from main shaft. In addition there is a speedometer type indicator mounted on the frame of main motor and driven by coil wire spring from the main shaft.

(i) Main Kingston Indicating Lights.

In the control room there are a series of switches with pilot lights in a single casing, and at the main Kingston control station there are indicating lights. Orders to men stationed at the Kingston may be given by turning the proper switch in the control room, which lights up both the pilot lamps at that station and the indicating lamps at the main Kingston stations. When the order transmitted has been complied with, a snap switch is turned at the Kingston control station which turns out both lights.

(j) Torpedo Electric Firing System.

There are electric torpedo firing push buttons in the conning tower, one for each torpedo tube. These push buttons are about $\frac{1}{2}$ inch in diameter, in water tight sockets with water tight cap which closes over them when not in use. At each torpedo tube there is an indicating colored light with the number of the tube marked on it. Connected to the torpedo firing push button in the conning tower, in parallel with this light, there is a lead to the firing valve with connections to an electric detonator which can be secured into place if using electric firing direct. This detonator on exploding opens the air firing valve. Firing may also be controlled from conning tower by leaving out the detonator and having the man at the firing tube open the air valve by hand when indicating lamp lights up. This system is energized by the interior communication motor generator, and therefore is A. C.

(k) Magnetic Compass Reflector System.

The magnetic compass in all boats is installed outside and forward of conning tower. A tube with a system of lenses is installed by which magnetic compass readings may be reflected on a ground glass plate either in the conning tower or to the main steering station in control room. The light for this reflecting system is on the interior communication system with an auxiliary connection to the main light system.

(l) General Alarm.

There is a general alarm push button in the conning tower and control room, with alarm gongs located in each of the main compartments of the vessel.

(m) Submarine Signal System.

Two electric sound oscillators, in general similar to the Fessenden oscillator, are installed in forward main ballast tanks. These are located one on each side of the keel. It is impossible to get the details of the oscillators, as they are secured to the hull, apparently with the front plate forming the outer skin. Frequency of the oscillators 1050 cycles, motor generator developing 2.35 KW. Motor generator may be started from the radio room, in which is installed the oscillator switchboard and receiving box.

(n) Marker Buoy.

Two or more marker buoys are usually installed on each submarine. This buoy consists of a simple metal float which may be released from within the boat with wire cable attached to the boat. This buoy is painted red, top is spherical and has secured to it the name plate, on which in large letters is stated that a German submarine is sunk at this point and that the vessel discovering this buoy should immediately telegraph to the Commandant, Submarine Base at Kiel, giving the position of the submarine.

(o) Recognition Signal Pistol.

In certain of the submarines there is a vertical tube or barrel extending through the top of the conning tower. There is a water tight gate valve to close the tube and at the lower end is a fitting for breech lock. This tube has a name plate on it indicating it is for recognition signalling. The breech plug has a rotary thread for attaching to the tube or barrel. The diameter of the cartridge is approximately 2½ inches and its length about five inches. The cartridge was inserted prior to attachment of breech plug. An ordinary pin was used with lanyard which apparently could be used

either from conning tower or from control room. It is believed that this apparatus could be used when submarine was submerged.

WIRING.

Wiring throughout consists of leaded and armored cable made up in general similar to our standard practice. The strands of the conductor are of tinned copper covered with rubber. Apparently poor grade rubber is used. There is a thin cotton wrapping next over which comes the lead jacket, and next is a paper wrapping; then a basket-weave steel wire braid. A. C. is used for lighting circuit to the magnetic compass, taken from the interior communication motor generator.

MISCELLANEOUS.

CONDITIONS IN GERMANY.

Source: Reliable. **February 1919.**

(11328.)

The following extracts from personal letters of officers of the United States Navy are copied verbatim, as it is considered that the information they contain is of significance.

CONDITIONS IN WILHELMSHAVEN.

We arrived in Wilhelmshaven late on Thursday, the sixth, having sighted a number of mines (both English and German) en route. We passed close to Heligoland about 3:00 p. m. on a very bright day, so we had a very good look. It is a most sinister looking block of red sandstone. No guns, emplacements, or works of any kind could be seen. Ice was pretty heavy at Wilhelmshaven, but we were able to anchor fairly close inshore.

Put ashore the next morning as interpreter for the Armistice Commission inspection party, and kept myself busy as the proverbial bird-dog collecting information of all sorts. The German ships were all in a most frightful state, both as regards cleanliness and preservation. They had evidently been hastily put out of commission, for there was no one whatever on board, not even a shipkeeper, although a few men (apparently squatters) were living on board simply for the sake of a roof. That the ships had been put out of commission in a most careless manner as well as very hastily was everywhere apparent, for although some attempt had been made to grease guns and working parts the job had not been properly done, and guns were already beginning to rust, both inside and out. The ships that were in commission, as for example, the new light cruiser *Koenigsberg*, were also in a hopeless condition, although they had large crews on board. I have never seen a ship in commission as frightfully filthy as the *Koenigsberg*.

Before going aboard we asked that the crew be removed in order to facilitate our inspection. The captain immediately gave the neces-

sary orders, but the crew straggled up by twos and threes in a most desultory manner. Most of them were smoking the large cigars made of cabbage leaves soaked in licorice and tobacco juice which are now very much the fashion in Germany. As we were being considerably delayed by the slowness in clearing the ship, I asked the captain whether this could not be expedited. He answered that he would give further orders, but that we would undoubtedly simply hear the men tell him "to go to hell." and that if they did so, the only thing left for him to do was to smile and go to hell. As this rabble came out on the dock where we were patiently waiting, the men crowded around us, so that it was necessary to ask the captain to have them withdraw sufficiently to allow us breathing space.

I think the literal translation of his words of command describes the situation as regards discipline more thoroughly than could pages of explanation: "please, it is requested that the men withdraw;" "please, just a little distance for just a few minutes, please." The men then moved slowly away, and sulked and muttered. We also inspected the destroyers, submarines, and aircraft station. Conditions were everywhere alike—everything unspeakably filthy; no work being done; everything going to rack and ruin.

Political conditions at Wilhelmshaven are considerably better at present than they have been for some time. Some six days before our arrival a band of freebooters had come down from Berlin, and seized the Rathaus in the name of the Spartacus party. They then captured the bank, seized all the money (some seven million marks) and retired to the barracks to divide the swag. While they were thus pleasantly occupied, a hastily organized party consisting of about 450 ex-officers and warrant officers and a smaller number of loyal petty officers and sailors attacked them, and after a siege of some three hours captured the entire Spartacus party and their loot. With the exception of 400,000 marks, all the stolen money was found and restored to the bank. The Spartacists were then imprisoned in the local jail, and there they remain. The civil authorities then assumed charge, although the hastily organized battalion still keeps up a patrol.

Everyone is satisfied that for the present at least the bottom has dropped out of the Spartacist movement at Wilhelmshaven. And as a matter of fact it becomes increasingly evident that the Spartacists never had any definite political idea; they confine themselves altogether consistently to looting and pillage. They are just about finished now; another month will see them entirely wiped out, if Germany gets enough coal to start her industries and gives her men much needed work. It would appear that the very name Spartacus is unlucky, because, as I remember the story about the original Spartacus, he and all his followers were wiped out, were they not?

During the Wilhelmshaven attack, some thousands of soldiers and sailors stood by and took no part in the matter, except that of interested spectators. A horse in a passing cart was shot in the beginning of the attack, and within twenty minutes after it fell every shred of flesh was stripped from its carcass. This indicates the meat shortage even more plainly than the empty meat shops do. Meat sells at some twenty-nine or thirty marks a pound, including bone. Grocer shops appear fairly well stored, but prices are enormous. Everything except potatoes and cabbage is rationed, including clothing. Great quantities of potatoes and cabbage are on hand and, counting the difference in exchange, they can be bought considerably cheaper here than in England. Practically no vegetables of any other kind are on hand. No tinned vegetables are obtainable in any of the shops. The sugar ration has been slightly increased on two occasions within the last year and it is expected to be further increased shortly. A newly discovered process of making glycerine from certain waste products made possible this increase in the sugar ration, as previously the great part of the sugar output was used for glycerine and other munitions.

In addition to the coil spring tires of which you have seen illustrations, I noted a number of link tires with springs inserted in the spokes. They said that these had proved fairly effective in spite of the infernal racket they made. Most heavy trucks have broad smooth iron tires with no spring inserts of any kind. Bicycles and aeroplanes for the most part have rope tires, although a new form of coil spring is said to be a considerable improvement. A good many light weight motor cars use tires of a wood composition. These did fairly well for use at slow speed on perfect roads, but the lack of any resiliency caused excessive wear on the cars. I noticed a great many wooden shoes in the shops and on the streets. Practically no leather except very heavy sole leather is obtainable. Soles cost forty-nine marks a pair.

The first thing I noticed in going through the town was the enormous number of placards posted in places that heretofore had been sacred. The Rathaus, churches, schools and even the police station were newly plastered with these placards and showed evidence of former placards that had been torn down. The most conspicuous of these signs was one which read: "We have a right to something besides work; we have a right to bread; labor which alone produces wealth alone has the right to wealth; no more profit." This was signed: "Workmen's and Sailors' Council." There was also evidence that a good many of these signs had been torn down. It appears that conditions at Wilhelmshaven came to such a bad pass principally because the chief of police was in league with the Workmen's and Sailors' Council. It was he who delivered some 6,000 stands of arms

to the workmen, and so gave the initial conflagration a tremendous start.

Much of the clothing was of woven paper. As a matter of fact this is not nearly as bad as it sounds and the industry will probably continue after the war. Practically all of the cotton mill machinery has been converted to spin paper cloth, and even were the supply of cotton increased enormously it would take a great many months before the mills could be converted to use cotton again, as the difference between the two installations is considerable. Even cord is of paper, and strange to say is quite strong. They have now developed paper cloth for dresses, paper sheets, and paper underclothing, which, with care, can be washed from seven to ten times. As the Government took all linen from hotels, paper sheets, table cloths, etc., are used. The shortage of clothes becomes very apparent as one walks about. The shortage of food is not nearly so noticeable. As a matter of fact, the Germans are not starved, nor even very hungry as yet, though they most certainly don't live well. One sees a good many double chins and paunches still, that is, among the men. The women really look emaciated. They have suffered from the food shortage a good deal more than the men have. In good old German style, the men still keep the lion's share for themselves. The saddest thing, however, is the suffering among the children. They show it and very markedly. Infant mortality has been very high, and still is, though not as bad as in the winter of 1916–17. I did not see a single millinery shop that had anything but black hats and mourning bonnets, and in all the women's shops about 90 per cent of the cloth displayed was black. Here again the difference between the provision made for men and women was to be seen. Almost all the real cloth that remains is being reserved for men's clothes; women use the various substitutes.

I spent about all the first night in Wilhelmshaven in reading German newspapers, and the placards and handbills distributed by the Workmen's Council, the Socialists and the Civil Government. I also got a number of the pamphlets with which every bookshop and kiosk is packed. I asked which pamphlet had been the most popular, and was informed that one entitled "Tirpitz, the Grave Digger of the German Navy," by Captain Persius, had had an enormous sale. A refutation of this pamphlet was also on sale but had not proven popular.

The newspapers devoted a great amount of space to outcries against "The Rape of the German Colonies," and to the injustice of inflicting penalties for the non-delivery of coal, at the same time demanding a further delivery of locomotives and rolling stock. It was stated that in spite of the coal strike and the insufficiency of the coal supply on hand, everything possible had been done to deliver coal as ordered, but

that it was impossible to fulfill the demands for delivery since the means of transportation had been taken away from them. Repeated outcries were made against this delivery of locomotives on the ground that lack of means of transport would mean that all factories would have to shut down on account of shortage of coal, and that the result of this lack of employment was doing more to plunge the country into Bolshevism than were all other factors combined.

But by far the greatest amount of space was devoted to outcries against the aggression of the Poles and the Bolshevist forces on the Eastern Front. The Germans apparently, just now, fear this more than anything else. They say that they do not so much fear seizure of territory by the Poles and that these attacks really have no political aims, but that this force of between 300,000 and 400,000 well armed men is simply a force organized to loot and to spread Bolshevism. The Germans have in all about 110,000 volunteer troops on the Eastern Front, and Hindenburg has just assumed command. They fear, however, that lack of provisions and communications will prevent him from holding out against overwhelming numbers. On all sides I heard wails about this aggression on the Eastern Front; it apparently has the Germans very much worried.

Went to Bremen by rail with three members of the commission detailed to inspect the ships there. Our compartment was the only one in the train that was either heated or lighted. There was no train from Bremen to Hamburg that night, so I made arrangements for a motor car early the next morning. Started out by motor but thought it advisable to give that up, as a fight between Spartacist looters and a Gerstenberg Regiment was then in progress in one of the towns through which we would have to pass. Accordingly I put back to Bremen and very fortunately got a train. There is no regular train service and the fifty mile journey which ordinarily requires less than two hours took somewhat over seven hours.

GERMAN OPINION ON ALLIED ANTI-SUBMARINE DEVICES.

At Bremen I got in touch with a number of former submarine captains, from whom I got a lot of exceedingly interesting information. One of them had more decorations than anyone, save a bandmaster, I have ever seen. In addition to the Iron Cross of the first class, he had the Pour le Mérite and palm, two household orders of the first class, and three other orders which I did not recognize. He had made twenty seven voyages in command of four different submarines. He had spent his entire time in the Irish Sea. He appeared entirely frank, though it is evident that some of his guesses missed. I feel confident that he was telling the truth.

Of course, my first question was what anti-submarine measures of ours he had feared the most, and secondly, which had been the most

effective. He said that at first all submarine captains were very much afraid of aircraft, but after one or two encounters with seaplanes they no longer worried about them; he said he had never heard of a single case where seaplanes did any real damage. He added, however, that most U-boat skippers were afraid to attack a convoy if aircraft were anywhere around because they were afraid that the aircraft would sight the sub and warn the convoy. He said that destroyers were dangerous for green or nervous skippers, but that experienced skippers who kept their heads could get away from them. He insisted that the great mistake that destroyers made, just like almost everybody else, was that they always set their charges for too great depths. His own invariable method was to dive to thirty feet, go ahead full speed with small rudder for about twenty minutes, then run up his periscope for a quick look around and maneuver according to what he saw. He said that on one voyage he counted 164 depth charges, none of which had injured him in the slightest. When asked about the effect of depth charges on the morale of the sub crew, he said that unless the explosives were very close no one but the man at the hydrophone knew anything about them. After the first few attacks the men got sort of used to it and used to make notches on a swab handle. He said that on his earlier cruises he had not allowed the hydrophone men to sing out when depth charges were dropped, but on his later cruises he allowed the hydrophone man to sing out every explosion; the crew did not mind, he said. He was of the impression that we used depth charges of two sizes, fifty and a hundred pounds, and said that they ought to have been much larger.

Speaking of the effect of depth charge attacks on the morale, he said that the one thing that had really gotten his nerve was one time when he was chased by three motor boats, which looked like submarines. He remarked that they followed him for over an hour, but that he doubled back and passed right under them, and that they dropped a number of bombs. He said that too many things had happened to him at too many different times for him to have any definite idea about dates.

He said that instructions had been issued to the effect that when attacked by vessels using hydrophones silent speed was to be used, but that no submarine had so far been able to get more than four knots at silent speed and that it was possible to get that much only when everything was in perfect condition. Experiments were in hand, he understood, to get more speed at silent running. I asked him whether he knew anything about our listening gear or of its effectiveness. He said that they had not had any information at all about it but that he himself had never believed the stories that

were current to the effect that our special motor boats, built to look like submarines, were able to hear up to thirty miles.

When asked about our mine fields—whether they were much feared and whether they had been effective—he said that of course he could not be sure, but he did not think that any submarines had been destroyed by them, because they knew the approximate locations of the fields and no submarines, as far as he knew, had been destroyed in these localities. He said that he could see the buoys, which when disturbed by any violent wave motion exploded the mines, so all he had to do in order to avoid all danger of the mines, was to change course to avoid bumping a buoy. He evidently had no idea of the principle on which these mines worked. He said he thought the great fault with these mines had been that they were entirely too small; he estimated that the charge was not more than one hundred pounds T. N. T. He said that three submarines, including his own, had been injured by these mines, but that all three had reached port. The explosion which injured him had caused a fire in his battery room, with the result that he could not dive, but that nevertheless he reached port on his Diesels.

He said that the greatest danger from depth charge attacks was in the case of green skippers who got panicky and dived too deep. The later German U-boats have to dive at a pretty steep angle (15 degrees), and so it often happened that panicky skippers went down too far and too quickly and consequently got caught by the depth charges with deep settings; or, when they heard charges exploding near them they made the mistake of keeping on going, and so got into too great depths. He said he had made that mistake himself. He had been following up a convoy on the surface at full speed for about two hours. He dived deep as soon as he had delivered his attack, and when attacked by the escorting destroyer he went down to too great a depth. During his long run to get into position for the attack his exhaust pipe had gotten so hot that when he had got down to a great depth he took in water in such quantities that he had to come to the surface immediately. That time he needed luck, and lots of it, to save him—and he had it in bunches; when he came up the destroyer was beating it at four bells in the opposite direction and did not notice him, although he was close at hand; there was a mist on at the time, so a few seconds were enough to save him.

On being asked what route U-boats usually took in coming out, and furthermore why they were so careless in opening up with their wireless, he said that skippers received general instructions concerning the station on which they were to operate, but the route to that station was entirely a matter for each skipper to decide for himself. He said he himself invariably came through Pentland Firth and never

had any trouble except that he very often had heavy weather. In this connection he mentioned that the later German submarines had very little stability at full load and steered very badly in a heavy sea. At the beginning of a cruise when the upper tanks were full of oil, the question of stability was often a matter of considerable concern. On account of this question of stability all designs of the later U-boats were modified by installing additional tanks in the superstructure. The question of giving away his location by using his wireless did not worry this skipper at all. He knew about the English wireless direction finders, but considered that to have this location spotted meant simply that a destroyer would arrive some hours after he had been there; that bothered him not at all. He added that just about the beginning of November it had suddenly flashed across his mind that the German point of view about the use of wireless was wrong after all, because it enabled us to route convoys so as to avoid U-boats. He said as far as he knew no U-boats had underwater wireless, although he had heard of experiments along that line. He said that they had habitually signalled up to thirteen miles by means of the hydrophone.

He said that he had been attacked on one occasion by an American submarine off the west coast of Ireland. This submarine had fired two torpedoes, both of which missed very narrowly, one by not more than ten feet. He could not give me the date or the exact location, but said that to the best of his recollection it was some time in August last. In speaking of our submarines he said that our subs invariably dived quicker than U-boats did. He said that he could never be sure of getting to twenty feet in less than forty-five seconds and that it often took him a minute. He added that all our torpedoes were apparently much better than theirs. He considered it useless to fire a torpedo at anything more than six hundred yards, and if he had any chance at all he got within 300 yards. He said that he had been attacked by gunfire on two occasions when he was within 200 yards of a ship, but that the guns could not be depressed far enough and consequently the shots went way over. He said that he thought that he had been saved more than once by slowness of trawlers and destroyers in dropping depth charges.

I asked about attacks on hospital ships and he answered that he himself had never attacked one. I asked about his orders concerning attacks on hospital ships, but could get nothing definite from him on this score, except that he stated the German Government had definite information that certain hospital ships had carried war material and personnel other than wounded or hospital corps.

In comparing our submarines with U-boats he said that he felt their Diesel engines and optical instruments were immensely superior, but thought that in other respects there was very little, if anything,

in favor of the U-boats. The largest submarines carried a complement of six officers, that is, captain and two deck officers, a chief engineer and two engineer watch officers, the latter two usually being warrants. The captain did all the navigating and bothered himself not at all about the engines. The officer of the watch always took charge of the diving and completed it before turning over to the captain in case of emergency.

GERMAN PUBLIC OPINION REGARDING NAVY.

The one sure thing about the German Fleet is that it is finished; and finished far more effectively than if every officer and man and ship had been sunk. With the exception of the U-boat men, the Navy and everyone in it is in disgrace. The U-boat men were loyal throughout all the revolution and are loyal to the Central Government today; but even they are ashamed of the Navy and now wear soldiers' uniforms. Hardly anywhere does one see a sailor in uniform. So thoroughly is the shame of the Navy felt that the blue uniform is considered almost a badge of disgrace, and except for the uniforms of the men on the few ships still in commission one never sees any blue, although the streets are crowded with thousands of men in the forestry gray of the infantry.

The principal support of the Central Government is the so-called Gerstenberg division, which consists of three scant regiments made up almost entirely of ex-officers and non-commissioned officers and commanded by a Colonel Gerstenberg, who hastily organized this volunteer force to oust the Spartacist group. A force of 6,000 men from this division was dispatched from Berlin to Bremerhaven to oust the Spartacists there. They accomplished this within twenty-four hours, proceeded to Cuxhaven and threw out the Workmens Council and near-Bolshevist forces which had seized control there. The Gerstenberg troops then proceeded to Bremen, where they repeated the performance, and thence on to Geistemunde, where they again cleaned up the show. I understand they are now on their way to Hamburg to take charge of the situation here. All of this has been accomplished within a period of some thirteen days. The so-called Marine Regiment has taken over the patrol of a number of cities and is making good the work begun by the Gerstenberg Regiment.

Although one finds hardly any trace of interest in the future of the Navy and the surrendered U–boats and ships interned in England, a good deal of interest has been manifested concerning the disposal of the merchant fleet. However, if the delivery of food to Germany is made dependent on the turning over of the merchant fleet not a voice in Germany would be heard against turning over every ship that floats, lock, stock and barrel.

Strangely enough, one hears no wails about the enormous indemnities that Germany will be made to pay. It seems perfectly obvious to Germans that the Allies will make them pay to the limit of their capability, because it appears to them self-evident that if they had won they would have made the rest of us pay right up to the verge of bankruptcy. And just about every minute I am in Germany makes me realize more thoroughly than the whole war has done that if Germany had won they would have made us sweat blood and sweat blood, and sweat blood until there was no more to sweat. This feeling is being so thoroughly ground into me that at times I almost want to fall on my knees in the middle of the street and thank God for the victory. And although the Germans are servile and bootlicking now, it simply makes one the more thoroughly certain of how arrogant they would have been were the present situation reversed. There is no doubt that the German leaders understand very thoroughly that Germany has been licked; neither is there any doubt that the people in general do not understand it and that everything is being done to keep them from understanding it. And the more one sees of Germany and the Germans, the more certain does one become that all our talk about the German character having changed and that the Germans are beginning to realize that civilization has gone too far to revert to "frightfulness" is without any foundation in fact. To be sure, Germans realize that they have made mistakes, but their idea of having made mistakes is simply that military blunders were made, and they believe in "frightfulness" as thoroughly to-day as they ever did. The only thing that could bring home the real truth to Germans is when they once feel the bitterness of a real defeat. They do not feel that now; and for their sake as well as that of the rest of the world they should be made to feel it. Their only idea of defeat is that military blunders and Bolshevism turned a long succession of victories into a defeat of the military forces.

I asked about the Kaiser; the sum of all the answers is that the Kaiser to-day, even if not openly popular, nevertheless has a greater hold on the respect and affections of the Germans as a whole than has any other man in the Empire. The Crown Prince is not popular. They say that the Kaiser was badly advised, but that after all no man in Germany had the interests of Germany so closely at heart or worked as hard or tirelessly as did the Kaiser. Another idea which is also very widespread is that the great General Staff which he reared so carefully became a car of Juggernaut and rolled on over him. They all agree that he was weak about the use of gas. They say that he had forbidden the use of gas but was later overruled by the Military.

No one thinks that the use of gas was wrong, though quite a good number think it was very foolish to start off on a small scale. They argue that if the Kaiser had allowed the use of gas on the tremendous scale that the General Staff wanted them to at the beginning, they would have won the war before the Allies had gotten gas masks. It is also said that the Kaiser opposed air raids on undefended towns in England but was overruled by the General Staff. I have heard a great many bitter criticisms of the German chemists who could not discover a non-inflammable gas for Zeppelins, while American chemists did.

Perhaps the most disquieting things one sees, are the great preparations that are being made for enormous emigration to the United States. Strangely enough, this is being encouraged by the authorities. Their idea is that if they lose their colonies and the greater part of their former markets, Germany will not be able to support the present population and that the first need for Germany is therefore the opening up of new markets. Accordingly people are being told that the best way to serve the Vaterland is to go to the Americas, and there open up markets for German goods by the simple process of buying only things "Made in Germany." If immigration is unrestricted in the United States there is no doubt at all but that the Germans are coming over in millions. I do not know what is being done at home on this score, but I feel that it is a great danger.

FOOD CONDITIONS.

In connection with the question of the amount of food on hand in Germany, the unequal distribution of food is noticeable. It is quite simple for individuals to get as much more food than the regular allowance as they can pay for, though of course prices are exorbitant for the additional food. The fare at the more expensive hotels is on the whole very good; for example, at the hotel in Bremen, we had hors d'oeuvres, soup, fish, roast goose, stuffed potatoes, red cabbage, cheese, ice cream and cake. The portions were all large, and I must say I have had much worse food in London at times. Later the manager came bustling up to me in a great flurry and said that he hoped that we did not think that what we had was the average dinner at the hotel, for on the contrary it was a special dinner provided for the Commission. Inasmuch as I had noticed that all other guests at the hotel were receiving the same fare that we had, and furthermore that the printed table d'hote menu contained all the articles served us, it was obvious that this explanation of the manager's was simply another one of the numerous attempts to impress the Commission with the fact that Germany is in a state of utter starvation. For lunch the following day we had hors d'oeuvres, soup, roast beef, mashed potatoes, cabbage and jelly pancakes. Of course these menus

are no indications of the amount of food in Germany, but they do demonstrate very clearly that food is not fairly distributed.

GERMAN OPINION OF AMERICAN ARMY.

In a conversation with some German Army officers I asked them if they would express quite frankly their opinion of the American troops. They said that before the German retreat the only troops that had any fight left in them were the Australians, a few of the French, and the Americans, and that the Germans knew they could go through the British at any time they wanted; and they did so. On the occasion of their big drive last March when there was nothing between them and the sea, their failure to follow up their advantage was not due to any failure to understand that they had made a gap in the British line some twenty miles wide or ignorance of the fact that the British were hopelessly tired and beaten; but their reason for not pressing on was simply that their whole transport system, which had never failed them before, had been all tied up by the necessity of transporting back to the Eastern Front all troops which had just been brought from there to reinforce the Western Front. The reason for rushing them away after all the effort of bringing them there was that they were even at that time impregnated with Bolshevism, which promptly destroyed the morale of all troops with whom they came in contact.

This general said that the failure on the Western Front was due entirely to the fact that they had brought over troops from the Eastern Front. The latter had done nothing since the break up of Russia, and this idleness had made the troops a fertile field for the propagation of Bolshevist ideas. This officer said that he himself had made a tremendous mistake in that he had been so confident of the loyalty of his men that he had not realized the danger of infection by the troops arriving from the East. He added that when the already infected troops came in contact with his troops, a whole army had crumbled up in almost a single night; as much so as if a hot breeze from hell had struck it. He said that the best thing that could have happened to Germany would have been a really determined offensive on the part of the Russians. He reasoned that the Germans could have licked the Russians, and then held the line with a comparatively small number of troops while they rushed victorious troops from the Eastern Front to finish up the job in the West. He said that after the rout on the Western Front it was simply a headlong race homewards, although the troops that had not come in contact with those from the Eastern Front were still loyal and fought stubbornly. He remarked impassively that it had been the most utter rout in all history. He insisted that if only they had brought no troops from the Eastern Front nothing could have stopped the of-

fensive last March. And incidentally, from what I have heard the English officers say, I am not sure that this claim is mere bravado.

In answer to my question as to whether he knew anything about the effectiveness of our 15-inch naval batteries, he simply remarked that if the Germans had not been bewitched by that ridiculous phrase "Our future lies on the Seas," they would have had all of their own big naval guns on the front in the very beginning of things, and then nothing could have stopped them. He added that the "Big Berthas" and other long range guns had all been manned by naval crews. He gave our 15-inch a high mark, and said that they had had the Germans rather badly bluffed for a time. Stories were current to the effect that we were getting ready a considerable number of similar units, and that they were to appear on the front at the same time that we let loose a lot of other newly invented horrors.

EXTRACTS FROM A LETTER OF AN OFFICER SENT TO INSPECT GERMAN MERCHANT SHIPS.

Anything that any German gives here in the way of information on conditions in Germany can almost certainly be contradicted by something that somebody else gives. I never realized before what a great amount of misinformation Intelligence must have to sift out of its reports. There are a few things that all classes, high and low, here, seem very much to agree to, and one is that there is a severe shortage of food to the point of great distress among the poor. Fats do not exist. There is almost a total absence of soap. They have, however, a substitute which is said to be very poor. The bread is bad: and one German stated, and a number corroborated his statement, that he was certain there was considerable sawdust in it, and some sand. There is very little milk in the country. Food conditions grow seriously worse and form a great source of anxiety. There is a very grave coal shortage, causing shutdown of even some of the few places which are endeavoring to run a limited number of hours a week. Shortage is reported due to turnover of rolling stock to French, and further to the fact that coal can not be transported by inland waterways on account of ice.

While here, temperature has been ranging from 14 up to 38 F., which we had today and which is the mildest day that we have had. Very little work of any kind is going on. Population do not desire return of Kaiser (though they exonerate him so far as being responsible for the beginning of the war is concerned). They desire strong central government modeled on our plan.

All witnesses greatly fear that continually increasing number of idle men, together with decreasing food supply and lack of work.

may drive a large number into the Spartacus party, which party at present is very few in numbers and very weak, though very noisy and very well supplied with funds, said to come from Russia to a considerable extent.

All are very severe in their criticism of armistice terms requiring the turnover of their transportation facilities, which they say is paralyzing the country, and they fear it will drive them into Bolshevism because of the great numbers rendered idle due to inability to get supplies.

The general sentiment is that Germany's only hope for help lies in the United States. General feeling exists that had United States not come into war Germany would have won. They said they were continuously deceived regarding the United States, though they realized it too late.

All the foregoing is based on information obtained from high officials of the ship lines, from officers, both Navy and merchant service, from people met up in town, and from workmen on the dock. If I started to tell the mass of stuff we have collected which can likewise be easily denied by various witnesses, it would certainly be laughed at.

A cake of Ivory soap over here is worth anywhere from 80 cents to a dollar in its trading capacity. Germans coming down to the docks will do everything but take the clothes off their backs for a cake of Ivory soap.

From the appearance of several of the German ships and of their remarkable cleanliness and the good shape of the engineering department, it is apparent that they have either taken very good care of them continuously during the war, or else had started in this year to get them in very good shape for resuming trade. Some of them were found almost immaculate and just as though ready for passengers to step aboard.

SURRENDER OF THE GERMAN FLEET—CAPT. SCHNELL, GERMAN NAVY (RET.), ON.

Source: German Officers' Journal.

(11287B.)

Does there exist a German Naval Officer who did not experience bitter sorrow on the 18th November when the honour of the German Navy was buried (had it not already died fourteen days previously?) and who did not think of that other expedition in the last days of July 1914, when the Fleet was assembled at Wilhelmshaven? There was then a great patriotic enthusiasm, a confidence of victory in the certainty of our good cause and a glad and honourable willingness to die.

Today there is the knowledge of a Fleet delivered up and irretrievably lost to a vindictive and merciless opponent; and what is worst of all, the unmentionable shame that the Fleet itself, our beloved, honoured and—one can also say—our once feared Fleet, invincible after so many deeds, should be betrayed together with the Fatherland at a moment of the greatest peril. And why:—because of cowardice—through the fear of another sea battle, thus causing the sacrifice of officers and crews by thousands. As if the officers would not have gone out, otherwise the accusation would have no meaning; for in the course of war it is only once that the individual can sacrifice himself for the benefit of the general community. Certainly to die is not pleasant, but it is a part of war. Whether the sacrifice of men's lives in certain cases is justifiable is a matter which, since the most ancient days and in all armies and navies, has hitherto been determined by the leaders and not by those led.

It is known by the whole world how sparing the German leaders have been with the lives of men confided to their care. There remains now the sorrowful and depressing fact that German sailors have mutinied through fear of death—a blot on the hitherto stainless shield of our pride and honour, which will not easily be wiped out.

Ah! then:—when on the 31st July the order came " danger of war threatens " and the cruisers and later the First Squadron left Wilhelmshaven docks and put out, there stood dense crowds on both sides of the shore. Everywhere waving of hands and handkerchiefs; bands played the " Wacht am Rhein " and with inspired hurrahs, which were answered by the crews on board, the ships glided into the stream.

Everywhere great efforts were being made to get our ships ready for battle, only to be interrupted by enthusiastic messages from our returning " Strassburg " in the Atlantic, and from all the United Home Ports and Associations.

At 8 o'clock in the evening came the mobilization order " Prepare for action." The commanding officers, and on the flagship the admiral, gave the well known order, and made an enthusiastic speech which was answered by three cheers for the Supreme War Lord whom we thanked for our proud Navy. On this morning the ships' regulations were not observed. No one went to bed. Until one o'clock officers and men wandered about on the upper deck and the ships' bands played patriotic tunes which were sung to with loud voices. One hurrah after another was given for the C-in-C, and officers etc. It was the proud moment of our lives.

That was then, and now—on the 18th November the greatest part of our Fleet—Germany's hope, again put to sea, but this time in bondage and humiliation.

Be comforted, you sailors and firemen, the Fleet is not going to Death but to Shame. For this reason be joyful and rejoice in the festivities which your "honour" has brought to your shameful lives. On this occasion of bitter sorrow you have decorated the outgoing ships as if they had come back from Victory. You have accompanied them with loud hurrahs as if they had done great deeds. These hurrahs are the death song of your honour; the wreaths are those of a funeral.

Deep sympathy there should be, and the highest consideration for the officers, who with bleeding hearts for the general good of the whole population undertook this difficult task—to conduct the Fleet to its funeral.

Two expeditions have thus been made over a period of 4½ years, but with what a spaceless difference in patriotic meaning and clean manly honour.

Will our Fleet, when later on perhaps we have one again; will it experience yet another expedition and be in a position to wash off the dirt from our shield?

GERMAN PLANS FOR NAVAL OFFENSIVE IN OCTOBER 1918.

Source: British.

17 February 1919.

(9417N.)

The following intercepted letter, from a German destroyer officer at Scapa Flow, dated 26 December 1918, contains among other information an account of the scheme of operations for a final naval action. This corresponds in general with the article published in Monthly Information Bulletin No. 3, p. 95.

One is seized with a holy wrath whenever one sees, alongside, these same destroyers that ran away from us so often on the Flanders Coast, and never dared to approach us except under the protection of their monitors. We have spoken to various British naval officers who were with the Dover destroyers and have taxed them with this. Their reply was that they too found it very painful, but that they had received orders from higher quarters not to expose themselves. . . .

On returning from Flanders from leave, I found a great deal of work awaiting me in my capacity as adjutant. Our half-flotilla, which had been reduced to two boats by damage from mines and aerial bombs, was to be reinforced by three others. Just as we had completed the redistribution of crews, confidential books, &c., we were obliged to clear out * * * We were compelled to spend the

whole night negotiating locks, bridges, and canals, and, owing to the fact that the force of the wind greatly delayed our passage through locks, we did not arrive in Zeebrugge until 6 a. m. There we found the mole empty. Six boats had already started on their homeward voyage. During the course of the day other boats from Bruges joined us, and we were to leave the following night—five boats in all. There was, however, such a high sea running that it would have been suicide to venture out, so we were obliged to remain throughout the night and the following day. The next evening the weather was equally bad, but we were faced with the choice of either going out into the storm or of running right into the arms of British light cruisers on the following night in calmer weather. We chose the former, and rolled as never before along the Dutch coast, arriving safely in Germany. Had we left two hours later we would have had English cruisers before us at Terschelling. Seven boats, some of which were in Bruges for repairs, others in Ghent for boiler-cleaning, and about the same number of submarines and torpedo-boats, had to be blown up. In addition all dockyard buildings and aviation sheds in Ghent, Ostend, Bruges, and Zeebrugge were blown up.

At the end of October, just as we were getting ready for the second part of our exercises, every single available boat was ordered to Wilhelmshaven. . . . We knew at once that some sort of enterprise was planned, although it was stated officially that the Fleet was going to carry out maneuvers. The following was actually planned: Several light cruisers were to make a raid into the Channel and bombard Dover and Calais. The destroyers were to act as a covering force and in the meantime to make their presence felt on the south-east coast of England—the mouth of the Thames, Downs, Margate, Ramsgate, &c.—and to sink patrol craft. In the meantime the Fleet was to take up a position at the south-west corner of the German Bight, about north-west of Terschelling, and was to attack the British fleet on its way out. As a preparation for the raid a broad channel had been swept clear of mines, which was necessary in the first place to make it possible to leave or enter the German Bight, and in addition there were seven lines of submarines stationed off the British naval bases to look out for any ships leaving. Every available submarine had been sent, and the U.-boat campaign was interrupted for the time being. Had the raid taken place, a naval engagement would have been fought, beside which the battle of Jutland would have been mere child's play. Our entire Fleet would have been thrown into the scale, and this would have led to the long-expected decisive battle ending in the total destruction of our forces and of the greater part of the British fleet. The idea was presumably to play the last trump. Had

the balance of losses been in our favour, the war might have taken a different turn; at any rate there would have been no armistice, or else a different one..

As our fleet was about to leave, the crews of various battleships refused to take part in the enterprise. In one ship the stokers drew fires, in others the capstan engine was destroyed or the forepart of the vessel occupied so that the anchor could not be weighed. The undertaking had perforce to be abandoned. No trouble occurred in the torpedo-craft, and I did not learn the reason for the change of plans until a day later. In Wilhelmshaven the unreliable battleships were guarded by Marines, and the ringleaders were put under arrest. A sad procession of 200 seamen and stokers was taken to prison under a strong guard. But why were our court-martial arrangements in such a hopeless condition that it was impossible to place the whole crews against the nearest wall and shot? That would have been a real remedy, and there would have been no recurrence. We then returned to Kiel to continue our exercises and one fine day we found ourselves in the midst of the revolution. Our crews made fun of the revolution, or its forerunner, to the last moment, and for this reason they were called bloodhounds and were hated by all the crews of big ships.

However, when the storm burst, they were compelled to join the movement by superior numbers. We got into communication with the station command and received a signal not to take any action as the authorities had already adopted all necessary counter-measures. Actually nothing had been done; the Commander-in-Chief (Admiral Souchon) had under-estimated the gravity of the situation (and not over-estimated it as the High Command in Flanders did) and then had lost his head, or at all events he failed, for in the opinion of all of us the movement could have been suppressed. Sitting on board our ships in the dockyard, all of a sudden we found ourselves prisoners in our messes, and were not allowed to go on deck except with an armed guard. At the first opportunity we went ashore, where everything had been organized very quickly, and remained in our lodgings until, reassured by Hindenburg's decree, we felt in duty bound to go on board and resume our duties.

As in the meantime the armistice terms had been published these duties consisted in preparing the boats for internment in a neutral harbor, as was at first assumed. For the last time the Fleet was assembled at Kiel, feverishly at work landing ammunition. Countless submarines were present, some quite new and commissioned only for trials, and others which, all unsuspecting, had just returned from some long-distance cruise.

On the morning of 21st of November we met the British Fleet about 50 miles east of the Firth of Forth. In the afternoon we anchored in the Firth, the weather being so foggy as to render the land invisible. We were immediately boarded by two British naval officers accompanied by a dozen men, heavily armed and full of fear that they might lose their lives. With painful exactitude they searched the boat for arms and ammunition. From the steamers which replenished our water-supply we immediately received newspapers full of their own "glorious" and our "defeated" navy, full of untruths, libels, self-praise, and vileness. It was so repulsive that I don't wish to touch another English newspaper, and I have lost what esteem I still had for them. Two days later we proceeded on our voyage and arrived off Scapa Flow on Sunday afternoon, 24th November. . . .

Fishing became our chief occupation from the start. We made ourselves large nets, and after introducing various improvements we made a daily catch of over 1,000 fish in fine weather. Yesterday a seal, attracted by the great number of fishes, blundered into it, in his clumsiness. We immediately captured him. We don't know what to do with him—whether to set him free or convert him into soup and cigar cases.

The treatment meted out to us by the British is fairly "negative" and consists entirely of prohibitions and orders, which all go to prove that they are in mortal fear of the Red movement spreading to them. Boat communication between the various groups of destroyers is permitted only from 9 a. m. to 3 p. m. (at first it was not allowed at all), going ashore is prohibited, a great number of ship's boats have been taken away from us, and provisions and other necessary materials have to be sent from Germany. They have on principle refused to sell us the least thing except water. The reason is that they have nothing themselves. Many circumstances which we have observed here point to this, and the English themselves have admitted in their newspapers that they were at the end of their tether, and would have collapsed had the submarine campaign continued a few more weeks. Various officers have confirmed this; an Irish officer stated quite openly that such an ending to the war did not suit him at all, and that he would have preferred to see the British Fleet in Schillig Roads—interned, of course. We are guarded by about an equal number of destroyers which are relieved every fortnight, and we find it very interesting to observe the different types of British vessels and to make comparisons. As regards gun armament we have the superiority; on the other hand the British boats are more seaworthy and faster.

CONDITIONS OF RUSSIAN RAILROADS.

Source: Reliable.

20 March 1919.

(11436.)

Lack of fuel for locomotives and factories for repairing them is responsible to a considerable extent for the present condition of the railways of Russia. At the beginning of 1917 the length of the Russian railways was 64,000 versts.* When the government of Kerensky fell this mileage had been reduced by 19 per cent. Under Bolshevik régime a reduction of 58 per cent of the railways left by the Kerensky government resulted. The railway mileage and usable locomotives and cars further decreased under the Bolshevik régime. The mileage amounted in October, 1917, to 52,000 versts; locomotives in working order 15,000; cars 520,000; in October, 1918, mileage amounted to 22,000 versts; cars 227,000; locomotives 5,000. These figures show only a general decrease in mileage and rolling stock and refer to only those portions of Russia under the control of the Bolsheviks.

At the end of 1918, locomotives to the number of only 4,500 were in working condition during the current year. Of these 1,500 are expected to become unfit for use. There was one locomotive in 1917 in good condition for every 3.4 versts of railway and one damaged locomotive to every 9.79 versts. There were 9.9 usable cars per verst. A year later, for every 4.3 versts there was one locomotive in good condition, one damaged for every five versts and 10.4 cars per verst. The percentage of damaged locomotives is growing rapidly and the supply of skilled labor for repair work is decreasing. In 1916 559 locomotives were repaired, in 1917, 396, in 1918, 80, and even with this record it is proposed to repair 7–800 in 1919. It is doubtful that the figures for 1918 can be exceeded for this year. There is only 1½ months' supply of crude oil at Soromovo, one of the best railway machine works. They are beginning to use wood in other shops.

The bread ration given to workmen from July to October in the three most important railway machine shops varied from two pounds per person per month to twenty-six pounds. This condition of semi-starvation explains partially the fact that out of 8,000 locomotives ordered only a few were turned out, as well as 3,500 freight cars, 30 special cars and 170 passenger cars.

At present there are many reasons for the deplorable state of the Russian railways. The principal ones are lack of food, fuel and iron, but not less important is the anarchy existing in the administration of the railways. The Highest Council of State is supposed to control all railway questions. It submits to Commissar of Ways and

*A verst is the equivalent of 0.6629 mile.

Communications to run the railways, but in fact they are run practically by railway men and railway unions, which have men of small caliber vested with great authority. These organizations, as well as private individuals, have too much to say on questions of railway management. There is no co-ordination between the central and provincial authorities. There is no central administration; there is no utilization of usable rolling stock and there is no practicable distribution. On some small branch lines with small junctions 40 per cent of the locomotives remain idle; also, great numbers of cars are sidetracked by local agents with supplies which are most essential for the economic life of the starving country. These cars sometimes unknown to the higher officials often remain for months.

Discipline in labor has decreased enormously. No sense of duty toward the State is possessed by the workmen. Wages of railway mechanics and laborers are worse than any other lines of industry and the result is that the best technical men, specialists, etc.. find more profitable work in others of the numerous institutions of the Soviet.

It will be seen from the above that unless improvement can immediately be made in existing conditions the whole railway traffic of Soviet Russia will be abandoned shortly.

Realizing the critical condition of railway transportation the All-Russian Central Executive Committee decided recently that the management of the railways should be taken away from the railway men of the trade unions and railway officials and vested in a committee representing all persons actively engaged in railway repair work and railway operations. The question of the production of rolling stock repairs is to be concentrated in a special department of the Highest Council of State Economy; in the various factories the workmen are to be given no preference for food supplies. These measures are well meant and would accomplish something if carried into effect, but up to the present the excellent and practical decisions of the cleverest authorities of Soviet Russia remain on paper to a considerable extent.

CONDITIONS IN MOSCOW AND PETROGRAD.

Source: Reliable.

24 February 1919.

At present there are in the prisons of Moscow in all about 200 foreign civil prisoners, of whom there are 50 each of Poles and Ukrainians, 54 English, 11 French and 2 Americans. However, many of these are by this time probably on their way out. Although some are under sentence of death, no foreign citizens have been shot and the tales of the executions have been greatly exaggerated in general.

Only 371 prisoners had been executed outside of Moscow and Petrograd by the Soviet Government and in all probability not more than 1,000 in Petrograd and 500 in Moscow, according to a statement of Peters, head of the Commission for Combating Counter-revolutions. Excellent police order is maintained by the Soviet Government in the streets of Petrograd and Moscow and it is at present severe and swift in punishing crime, although this discipline does not apply to the provinces. Food conditions are very bad and growing worse. As the Government takes over all surplus, the peasants have no interest in raising more than enough for their own consumption. In Moscow all stores and hotels are closed and for lack of fuel both these cities are in darkness and cold. Even the comissaries of foreign affairs work in a temperature of two degrees frost. For lack of fuel and necessary materials for repair and maintenance, it is probable that all railroad communication will be impossible in a few months. Only 20% of the locomotives in the country are serviceable at present and their condition is very bad. Only cattle and freight cars are available for travel.

Although elementary schools are open where the pupils exercise the Soviet principle in being able to depose their teachers if they do not care for their discipline, education is at a practical standstill. Because there was no further need for the study of law under the Soviet regime, the law courses at the universities have been abandoned and placed under the guidance of some illiterate commissioner. The remaining portions of the universities are carried on half-heartedly. Services are still held by the churches on Sundays but the influence of the clergy is practically nil and all their land and property has been nationalized.

Lately there have arisen certain inconsistencies of the Bolsheviks to their own principles. A concession has been granted by the Soviet Government to the Norwegian firm of Hannevig for completing a new railway to exploit the timber resources in northern Siberia. As representing respectively the moderate and extreme Bolshevik elements, the breach between Lenin and Trotsky was rapidly widening until about two months ago when the talk of intervention, purposely exaggerated in the Bolshevik papers, caused all factions to unite. Peters, the chief apostle of frightfulness, lost his almost dictatorial control as a slight concession to moderates. The distrust of foreigners has increased with this union and in a few days the only remaining diplomatic mission, the Swiss, is about to leave Petrograd. As there are very few Germans in any part of Russia since the evacuation of the Ukraine, which was held by a German army of 600,000, this departure will mean that there will be practically no foreigners left in Russia.

On account of the lack of the necessities of life the Soviet troops are daily growing more discontented, and therefore the government secretly hopes for an armed intervention which would unite all forces in an active battle against an invading enemy. The *petite bourgeoisie*, moreover, fear an Allied intervention lest it replace czardom, thus laying a sure foundation for another outbreak of terror in Russia. Even among the Russian *intelligencia* there is no party at present devoted to the royal house or to the royal idea. When they dare express themselves, it is the concensus of opinion among the sober minded Russians, as well as among those who have had opportunity of watching the present movement in Russia, that the only hope for an ultimate solution of Russia's difficulties lies in a policy of isolation completely cutting off Russia from all means of importing supplies from abroad and from all means of propagandizing foreign countries. As soon as present meager stores were exhausted, such a policy would bring about such confusion and hardship that the fall of the Soviet Government would be inevitable and its theories for all time nullified.

ECONOMIC DEBT OF NEUTRAL NATIONS (COMPARATIVE STATEMENT).

Source: Reliable.

7 February 1919.

Country.	National debt increase, figured in even million dollars.		Per capita.		Increase, per cent.
	1913	1918	1913	1918	
Norway	97	161	$39.15	$64.80	65
Sweden	193	357	34.56	62.91	85
Denmark	96	157	33.57	54.81	60
Holland	469	844	73.98	133.11	80
Switzerland	26	265	7.29	68.31	836
Spain	1,827	2,002	69.10	97.47	10

Country.	Currency in circulation, figured in even million dollars.		Gold reserve, figured in even million dollars.		Proportion gold reserve to circulation.	
	July, 1914.	July, 1918.	July, 1914.	July, 1918.	1914	1918
Norway	33	100	22	33	65	33
Sweden	61	186	27	71	45	38
Denmark	42	105	21	50	50	47
Holland	172	383	65	227	38	75
Switzerland	79	148	37	74	47	50
Spain	376	574	105	424	28	75

NOTE.—The apparent decrease in proportion of gold reserve to circulation in Norway during the war is only an apparent one, as Norway has vast funds, earned during the war, outstanding principally in United States and England, on which they are depending.

APPENDIX.

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE—8 MARCH TO 5 APRIL, 1919.

Subject.	Date.	Pages.	Reference number.	Remarks.
AVIATION.				
Lessons on Aeronautics	27 Jan. 1919	367	11339	Translation from Italian text-book prepared by Prof. Emilio Bianchi. This is Vol. II (The Dynamics of the Dirigible).
Repairing *HS-1L* and *HS-2L* flying boats to overcome fin troubles.	26 Feb. 1919	5	10212D	Bureau Construction and Repair, Aircraft Technical Note No. 136.
Italian low speed wind tunnels.	11 Feb. 1919	1	5087	Describes channel at Instituto Centrale Aeronautico, Rome.
Italian observation balloon	— Jan. 1919	[1] 32	10525	Description of a new type of Italian observation balloon.
Valve settings on "C" class dirigibles.	10 Mar. 1919	[2] 2	10212D	Bureau of Construction and Repair, Aircraft Technical Note No. 137.
Comparison of strength tests on balloon cloth.	28 Feb. 1919	5	10212D	Bureau of Construction and Repair, Aircraft Technical Note No. 138. By Lieut. (c. c.) H. A. Gardner, U. S. N. R. F., with report by Bureau of Standards appended.
Bombing of submarines	20 Mar. 1919	[3] 3	11364	Photostats of 3 Royal Air Force technical designs.
F-5L Flying Boat Handbook.	— Dec. 1918	[4] 47	11368	Directions for unpacking, assemblage, care and maintenance of above flying boat.
British anti-submarine air patrol.	— June, 1918	1	4827	Photostat of statistics for June, 1918.
Sinking of submarines by aircraft.	July, Aug., and Sept., 1918.	3	11412	Report from U. S. naval forces operating in European waters.
Japanese aviation	14 Feb. 1919	2	9318	Report on present condition of Japanese air service.
French aviators in Japan	14 Feb. 1919	1	11389	List of personnel of French aviation mission to Japan.
Inter-Allied naval armistice commission on aircraft.	—Dec. 1918	[5] 28	11388	Report on German naval aircraft.
British aviation	1 Mar. 1919	20	11265	Press review on aviation for week ending 22 Feb., 1919.
Norwegian merchant marine.	26 Feb. 1919	4	9256	Report on condition regarding above.
COMMUNICATIONS.				
Cadiz, Spain	17 Feb. 1919	4	3112	General intelligence report, giving radio stations, etc.
Inter-Allied Radio Conference.	27 Feb. 1919	28	9306	Proposition drawn up by French regarding radio questions. Text and translation.
Spanish strategic railroads	16 Jan. 1919	7	11393	Offer for sale of railroad concessions, including railways joining San Fernando and Cartagena, Spain.
CONSTRUCTION AND REPAIR.				
French Navy, types of ships required.	1919	9	11303	Translation of article by Comdr. Cartex of French Navy entitled "What Should We Build?"
Japanese shipbuilding	22 Jan. 1919	2	787	Collapse of new Japanese commercial shipyards.
Holland, ships under construction.	19 Feb. 1919	1	1827	List of ships being built by the "Schelde" shipyard, Flushing, including one cruiser and five submarines for Dutch Navy.
Water-tight doors, Stone-Lloyd system.	21 Feb. 1919	10	2329	Descriptive circular of above.

[1] Also 8 plates, 22 figures. [2] Also diagrams. [3] Diagrams. [4] Also 57 figures. [5] Also 22 plates.

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE—Continued.

Subject.	Date.	Pages.	Reference number.	Remarks.
ENGINEERING.				
German submarines, photographs.	30 Dec. 1918	[1] 53	112221	Photographs of surrendered German submarines. (Some of these were published in Monthly Information Bulletin, No. 3, 15 Mar., 1919.)
Submarines	6 Jan. 1919	.....	11408	Concerning prohibition of construction of submarines by international agreement.
Submarine, *Deutschland*	24 Mar. 1919	2	9168	*Deutschland* reported sunk in Mediterranean.
INTERNATIONAL SITUATION.				
Government control of patents.	4 Mar. 1919	2	5827	English practice regarding "secret patents."
German trade with Scandinavian countries.	7 Feb. 1919	2	11332	Germany carrying on extensive trade campaign in spite of protests to the Allies that her trade is paralyzed. List of German goods appended.
Denmark's position during the war.	28 Feb. 1919	6	5542	Neutralization of Danish waters.
Chilean-Peruvian relations	.....	6	11175A	Tacua and Arica question.
Conditions in Turkey	1 Feb. 1919	7	7429	Report by U. S. S. *Scorpion*.
MISCELLANEOUS.				
Dutch merchant marine	21 Feb. 1919	20	9846	Copy of "Scheepvaart Index," giving list of Dutch merchant ships.
Italian losses in European war.	10 Mar. 1919	9	10594	Complete official statistics.
Japanese Navy, recruiting	30 Jan. 1919	1	11320	Trip of Admiral Kato to stimulate recruiting.
Reports on German finances.	24 Feb. 1918	2	11161	Analyzing Germany economic condition and national wealth.
Aniline dye industry	12 Nov. 1918	10	11416	German economic conditions as regards chemical industry and dyestuff production.
Baltic cruise	11 Jan. 1919	4	11404	Report of Rear Admiral Andrews concerning conditions in the Baltic, Denmark, and North Germany.
National indebtedness of various countries.	7 Feb. 1919	1	11415	Showing national debt, currency in circulation, etc.
Navigation	11 Mar. 1919	2	6262	Navigation of upper Danube.
Italy	28 Mar. 1919	2	9270Q	Economic, political, and military situation in Italy.
Denmark	20 Feb. 1919	3	11182	Bolshevism in Denmark.
Germany, conditions in	26 Feb. 1919	3	11204	Notes on the present situation in Germany.
German naval committee	24 Mar. 1919	2	11406	The organization of the fleet.
Jugo-Slav's relations with Italian Navy.	11 Mar. 1919	2	11411	
Finland	27 Mar. 1919	2	10643	Finnish military information.
Industrial conditions in Japan.	12 Feb. 1919	4	11402	Labor question given a great deal of attention by the public and Government.
Political parties in Japan	12 Feb. 1919	3	11400	Setting forth political platform of the different parties.
Japanese financial notes	13 Feb. 1919	4	10452	Substance of speech by Baron Takahaski, finance minister.
Reconstruction in England	31 Dec. 1918	44	11428	Report on the work of the ministry of construction.
Review of maritime jurisprudence.	.....	4	11418	Maritime insurance—Policy in "Quovis"—Participation of the name of the vessel. Tardy payment of premium.
Navigation of Rhine	10 Feb. 1919	5	11420	Regulations laid down by the Inter-Allied shipping commission for the navigation of the river Rhine.
OPERATIONS.				
German war game, "The U-Boat War."	11 Mar. 1919	[2] 2	11340	Game complete, with directions for playing.
French Naval War College	24 Jan. 1919	2	382	Description of the course for officers.
Bulletin of officers in Italian Navy.	1 Jan. 1919	61 54	11369 11369A	Lists of active and reserve officers of Italian Navy, with stations as of above date.

[1] Photographs.

[2] And game .

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE—Continued.

Subject.	Date.	Pages.	Reference number.	Remarks.
OPERATIONS—Contd.				
Japanese naval mission in Italy.	20 Feb. 1919	2	11011	List of members, and approximate purpose of Japanese naval mission to Italy.
Swedish Navy	1919	162	11384	List of commissioned officers, vessels, etc.
Norwegian Navy	1919	56	11390	Norwegian naval budget for 1919.
Bombardment of Paris by German long-range gun.	3 Mar. 1919	2	10404c	Report by French authorities concerning projectiles which fell in Paris and outlying country 23 Mar. to 26 Apr., 1918, maps, etc.
ORDNANCE.				
British ordnance factories	24 Nov. 1918 27 Nov. 1918	5 7	7,250	Reports by Lieut. Comdr. N. W. Pickering, U. S. Navy, on Armstrong-Whitworth Co., and Vickers Co., Sheffield plant.
Determination of forces and moments on a 15-inch shell.	— Nov. 1918	[1] 14	11301	Technical report from experiments conducted by the Military Intelligence Division.
German munitions captured by Allies.	1 Dec. 1919	23 28 38	11050R 11050S 11050T	Photostat of French Report No. 17.
German mine fields in Mediterranean and Black Sea.	21 Feb. 1919	28	4621F	Official Italian statement regarding above.
German munitions captured by French Army.	1 May 1918	37 36 25	11050U 11050V 11050W	Photostat of French Report No. 22.
Italian design of projectiles	11 Feb. 1919	2	5693	Report on latest Italian design.
Italian aeroplane guns	11 Feb. 1919	1	6952	Description.
Italian incendiary shrapnel	11 Feb. 1919	1	11354	
Italian method of computing trajectories.	11 Feb. 1919	5	11349	Discussion of Italian ballistics, high angle trajectories, photographs of projectiles in motion, and interior ballistics.
Examination of German munitions.	1 Apr. ——	114	11050AA 11050BB 11050CC	Examination German munitions captured by French Army.
Italian Army and Navy proving grounds.	11 Feb. 1919	4	259	Report of tour of inspection.
Japanese explosives	30 Jan. 1919	1	5751	Regulations regarding tests and inspection of powder in Japanese Navy.
Post-war mine sweeping operations.	17 Feb. 1919	1	11337	German plans for above in North Sea.
German munitions captured by French Army.	1 Jan. 1919	38 35 40	11050X 11050Y 11050Z	Photostat of French Report No. 18, for the greater part untranslated.

[1] Also two figures.

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CONFIDENTIAL

Number 5—1919

OFFICE OF NAVAL INTELLIGENCE

MONTHLY INFORMATION BULLETIN

15 MAY 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 May 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

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A Digest of Reports received during each month by the Office of Naval Intelligence is appended to this Bulletin. In case an officer has a special interest in any subject appearing in this digest, a copy of the report will be provided him on application to the Office of Naval Intelligence.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE
NAVY DEPARTMENT
Washington, D. C.

MONTHLY INFORMATION BULLETIN

NUMBER 5—1919

15 MAY 1919

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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1919

CONFIDENTIAL.

OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 5—1919—15 MAY 1919.

FOR CONVENIENCE IN ROUTING.

Officer.	Initials.	Date received.	Date forwarded.
Captain			
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First Lieutenant			
Navigating Officer			
Gunnery Officer			
Communication Officer			
Engineer Officer			
Medical Officer			
Supply Officer			
First Division Officer			
Second Division Officer			
Third Division Officer			
Fourth Division Officer			
Fifth Division Officer			
Marine Officer			

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NAVAL AIR STATION, PAUILLAC.

From the air.

OPERATIONS.

SUMMARY OF ACTIVITIES OF UNITED STATES NAVAL FORCES OPERATING IN EUROPEAN WATERS.

Source: Vice-Admiral William S. Sims, U. S. N.

4 April 1919.

(10811 A)

FOREWORD.

The attached notes are not intended in any sense as an adequate or complete record of United States naval activities in European waters during the war. They have been hastily collected, as permitted by the pressure of other duties, to answer a demand from numerous sources.

The demands upon the Force Commander's staff have been such that it has been impossible to maintain an historical section during the war, and hence statistics have not yet been collected; and such as are to be found in the London files are in almost all cases incomplete.

Since the signing of the Armistice an historical section has been formed, and is now engaged in attempting to collect and compile authoritative and complete statistics, which will eventually be used for an official history.

In view of the above a great many of the statistics contained hereunder are only approximations, set forth merely to give an idea of the scope of the work of that part of the United States Navy which operated in European waters. Any use which is made of the material hereunder contained should take the above facts into consideration.

POLICY.

It is considered that the principal accomplishment to be credited to the United States Navy in European waters during the war is the degree and character of cooperation which it succeeded in carrying out in its joint operations with the French and British Naval services. This is an accomplishment difficult, if not impossible, to appraise in form of specific statements, nor can it be reduced to statistics.

The forces of the United States Navy in the summer of 1917 entered a naval campaign which was approaching its fourth year of progress and in which practically every form of naval activity existed. It was natural that an independent naval service with its

own peculiar methods, and to a great extent its own traditions, should naturally desire to put into practice under actual war conditions the results of its many years of peace training and preparation. It was also natural that such an independent service should resist being disintegrated and should desire to operate as much as possible as an independent unit.

Admiral Sims, however, took the decided stand, from the moment he was assigned to the command in European waters, that its major mission was to bring the maximum force possible to bear in a joint allied campaign against a common enemy. His policy, which was immediately made known to all the personnel of the command, was that this mission could be accomplished only by treating United States naval forces in the rôle of "reserves" being brought up to the front, and that this policy must be carried out regardless of any real or imagined sacrifices of the prestige of the United States Navy treated as an independent naval force. He furthermore stood out from the beginning for the principle of unity of command. In all dealings with allied services he asked only for free discussion in the council room, and insisted that the actual use to be made of United States Naval Forces should be determined solely from a standpoint of viewing the campaign as a whole, and treating the United States Navy as "reserve forces" of the other combined allied naval forces.

The mere statement of such a policy sounds easy of accomplishment, but those who have served in the European command are only too well aware of the contrary. It would take a good-sized volume to give adequate expression, even if all of the facts and occurrences could be collected, to the difficulties and the sacrifices which this policy involved.

Our forces were scattered, our peace-time practices and methods were often ruthlessly abandoned, and situations of the most varied character for which no precedent whatever existed were encountered and successfully met.

Our ships naturally found many practices, such as signaling systems, methods of operations, communications and methods of maintenance and upkeep, which they considered inferior to their own. It was natural, therefore, that they should feel that the efficiency of their operations would be lowered unless their own methods were adopted. In accordance with Admiral Sims' policy, it was pointed out to them that, even granting their contentions to be true, the fact remained that our forces were very much in the minority and that a serious war actually in its critical stage was no time to attempt to convince foreign services (which constituted the majority of the Allied Navy, treated as a whole) of the necessity of changing their methods, except very gradually and only in so far as to avoid con-

fusion or slowing down of the *joint* campaign against a common enemy.

We were outnumbered in any way from which the situation might be considered, i. e., as to numbers of ships, men or material. It was apparent, therefore, that, even granting that in many instances our own efficiency might be reduced by dropping our own methods and adopting others, nevertheless the reduction of our own efficiency, such as it might have been, could not be compared to the effect on the efficiency of the combined campaign if the much larger forces, well along in the third year of the campaign, should attempt to change their methods.

The difficulties of combined allied operations of warfare, that is, the difficulties of co-operation between foreign services, are well known to all students of history. This war has been no exception. There is no doubt whatever that the United States Navy in European waters actually broke all records in the degree and character of co-operation with foreign services which it succeeded in putting into actual practice. There is ample evidence supporting this statement, although naturally the majority has been in the form of unofficial comments and indirect information which has gradually found its way to light.

There is excellent reason to believe that the example set by this accomplishment had a marked effect upon the efficiency and progress of the campaign.

It would not be permissible at this time to enter into a discussion of the difficulties which the Admiral himself encountered in ensuring that his policies were rendered effective.

A BRIEF RESUME OF SOME OF THE ACCOMPLISHMENTS OF THE UNITED STATES NAVY IN EUROPEAN WATERS.

1. Escorted 62 per cent, or about 1,250,000 troops, of United States Expeditionary Forces to Europe without loss from enemy action.

2. Escorted 27 per cent of all United States, Allied and Neutral shipping carrying cargoes to France, England, and Italy during the period April 6, 1917, to November 9, 1918.

3. Laid 80 per cent of the Northern Mine Barrage from Orkney Islands to Norway. This involved the designing of new mines, their manufacture and shipment abroad, and the establishment of two large assembly and testing plants in Scotland. The mines were handled entirely by our own personnel and laid from a squadron of United States merchant ships converted into special mine layers. In one operation a field of 5,520 mines was laid in less than four hours—a feat unparalelled in the annals of mining.

4. All ships in European waters were used throughout the war as training schools for new personnel while carrying out their actual

war operations. Anyone familiar with the problems of naval efficiency is aware that one of its greatest requisites is permanence of personnel. Owing to the large expansion of the United States Navy during the war, particularly in the case of destroyers, and the problem of efficiency in manning new construction, it was necessary to use all ships for training purposes.

5. Ships self-supporting in all respects, except in case of serious accidents and docking.

6. Initiated tactics of so called "barrage system" in using depth charges. That is, using depth charges in large numbers. The tactics developed were eventually adopted in other allied services.

7. Established, manned and operated 9 shore bases to support cruising ships; and 34 aviation bases in England, Ireland, France and Italy, from which aircraft bombed enemy submarine bases and patrolled at sea in protecting convoys from submarines.

8. Admiral Sims created an organized Naval Aviation Force, Foreign Service, consisting of approximately 20,000 men and 5,000 officers. This personnel was distributed along the coast line of Europe, from the North Sea to the Adriatic, and successfully operated sixteen Seaplane Stations, four Dirigible Stations, three Kite Balloon Stations, two large Assembly and Repair Bases and a powerful Bombing Group located in Northern France.

The measure of efficiency of this Aviation Force on Foreign Service cannot be figured according to any fixed scale. Its participation in the successful escort of U. S. troops overseas was a factor in the successful accomplishment of that gigantic task.

This entire force was organized into an operating unit under Admiral Sim's direction. The nucleus of this Force consisted of 100 men and 5 officers, from which a smooth-running, efficient and effective weapon was made.

9. As we had more personnel than equipment until late in the game, assisted Allies, by loans of aviators, aviation mechanics, telegraphers, and many other types of skilled men.

10. Advised and assisted Mr. Hoover in operating food ships through Europe. Established naval organizations in every port of Europe where U. S. merchant ships called; this in order to assist them in every way and look out for their interests. During the war all peace time port facilities upon which merchant shipping depends was wholly disorganized and in many cases had ceased. Since armistice these naval port offices have been greatly extended from Baltic to Black Sea.

11. Operated fleet of 67 ships manned by Navy carrying coal from Cardiff to France to meet needs of Army.

12. Assisted in carrying out surrender of German Fleet and Armistice Conditions with Germany and Austria.

13. Assisted in obtaining neutral ships to carry troops.

14. Equipped, manned and operated on the Western front with French and United States Armies a battery of mobile great naval guns which had been designed by the Navy for their battleships. Range over twenty miles. The operation of five complete gun trains with the French and American Armies by purely Naval personnel was unique. To understand the character of this work it should be appreciated that all material was designed and manufactured in the U. S. in a remarkably short time, was brought to France by the Navy and the more than 75 cars, 6 locomotives and the gun mounts were landed and erected by the Naval personnel which operated them on the front. In this expedition the Navy furnished the most powerful artillery used on the Front by the Allies.

15. One hundred and twenty submarine chasers were distributed in Irish Sea, English Channel and Adriatic, to assist in the offensive warfare against enemy submarines. Five special and three auxiliary bases were constructed and manned to support these chasers. The sub-chasers were operated in groups and the personnel specially trained in submarine hunting by means of listening devices.

The success of this enterprise can only be shown by the large number of contacts made and attacks executed, for in this way the chasers continuously harassed the submarines and interfered with their operations.

16. Based and operated a flotilla of seven submarines from a base in Ireland, and five submarines from a base in the Azores. These submarines patrolled convoy lanes and seriously hampered the enemy's operations, as is shown by their record of 21 sightings in which four torpedo attacks were made, one resulting in the destruction of an enemy submarine.

17. Reinforced the British Grand Fleet with five United States Battleships. This squadron became a distinct battle unit of the Grand Fleet and participated in all operations of that Fleet. The American squadron also took its turn with other units of the Grand Fleet in doing convoy and escort work. On at least two occasions it was in its assigned place in the battle line when a possibility of an encounter with the enemy fleet existed.

18. A division of United States dreadnoughts was based on the west coast of Ireland, and held themselves in constant readiness to oppose any threat on convoys by enemy battle cruisers or other heavily armed ships.

I. BASES.

On November 11th, 1918, there were, including aviation, 45 bases established in Europe; these were classified as follows:

Five bases for offensive warfare against submarines.

Seven bases for vessels engaged in escorting shipping.

One base, Cardiff, for coal carrying trade from England to France.

One, Ponta Delgada, Azores, for re-fuelling small craft crossing the Atlantic, and also to prevent the establishment of an enemy base.

One, Malta, as Headquarters for United States Naval Representative in the Mediterranean.

Thirty Aviation Stations.

SUMMARY OF BASES.

NAVAL.

Base.	Date Established.	Purpose.	Personnel.
Queenstown	May, 1917	Escort Duty	6,918
Brest	June, 1917	do	7,866
Gibraltar	August, 1917	do	4,267
St. Nazaire	June, 1917	do	50
Bordeaux	do	do	75
Inverness	December, 1917	Mine Barrage	5,343
Invergordon	do	do	1,131
Ponta Delgada	August, 1917	Refuelling base for small craft	658
L'Orient	January, 1918	Escort Duty	590
Rochefort	do	do	1,175
Corfu	May, 1918	Submarine hunting	1,275
Plymouth	June, 1918	do	1,631
Cardiff	September, 1918	Army Coal Trade	1,624
Malta	do	Headquarters for United States Naval Representative.	
Bizerta	October, 1918	Mine Barrage	

AVIATION.

Queenstown, Ireland	February, 1918	Seaplanes	
Whiddy Island, Ireland	April, 1918	do	
Wexford, Ireland	do	do	
Lough Foyle, Ireland	do	do	
Killingholme, England	do	do	
Dunkirk, France	December, 1917	do	
Trequier, France	March, 1918	do	
L'Aber Vrach			
Brest	December, 1918	Seaplanes	
Ile Tudy, France	January, 1918	do	
Le Crossic	November, 1917	do	
Fromentine	February, 1918	do	
St. Trojan	December, 1917	do	
Arcachon	March, 1918	do	
Pescara, Italy	June, 1918	do	
Porto Corsini, Italy	August, 1918	do	
Queenstown, Ireland	February, 1918	Assembly and repair	
Eastleigh, England	July, 1918	do	
Pauillac, France	December, 1917	do	

SCHOOLS.

Moutchic, France	August, 1918	Schools	
Lake Bolsena, Italy	March, 1918	do	

K. B. STATIONS.

Berehaven, Ireland	May, 1918	K. B. Stations	
Brest, France	June, 1918	do	
La Trinite, France	May, 1918	do	
La Pallice, France	April	do	
Guipavas, France		Dirigible Stations	
Paimboeuf, France	November, 1917	do	
Rochefort, France	June, 1918	do	
Gujan, France	do	do	

NORTHERN BOMBING GROUP.

Two wings, night and day bombing, each composed of four squadrons.

Considering the Northern Bombing Group as one Base, the total is 30.

It will be seen from the above table that the Forces were scattered over a comparatively wide area in accordance with the policy previously outlined.

II. FORCES (Increased by Quarters).

The total number of vessels, divided in types, actually operating from bases in European Waters, for each quarterly period since the United States entered the war, are given below:

Description	July, 1917	Oct. 1, 1917	Jan. 1, 1918	Apr. 1, 1918	July 1, 1918	Oct. 11, 1918	Nov. 11, 1918
Destroyers	20	30	47	56	61	66	70
Gunboats	.....	5	6	6	7	5	5
Coast Guard Cutters	.....	4	6	6	6	5	5
Submarine chasers	.....	.....	.....	.....	7	102	120
Yachts	.....	14	19	27	28	27	27
Submarines	.....	.....	8	12	11	10	12
Mine sweepers	.....	.....	10	9	11	10	13
Mine Planters	.....	.....	1	1	10	10	10
Cruisers	.....	2	2	2	3	3	3
Battleships	.....	.....	4	5	5	8	8
Tugs	.....	.....	.....	7	11	15	16
Cross Channel Transports	.....	.....	.....	.....	.....	4	4
Army Coal Trade	.....	.....	3	5	5	33	55
Tenders and Repair Ships	2	4	5	9	12	17	18
Miscellaneous	.....	.....	.....	4	6	8	7
Total	22	59	111	149	183	323	373

The following are not included in the above statistics:

4 Destroyers
2 Gunboats
1 Yacht
2 Submarines
1 Repair ship

Technically based in European waters, but at present in United States undergoing repairs.

3 Russian Destroyers manned by United States Naval Personnel.

16 Army Coal Trade Vessels not yet commissioned.

1 Refrigerator hulk in France.

AMERICAN NAVAL VESSELS ACTUALLY PRESENT IN EUROPEAN WATERS UPON THE CESSATION OF HOSTILITIES, GROUPED BY BASES.

		Total.
Queenstown	2 tenders, 24 destroyers, 30 chasers, 3 tugs	59
Berehaven	3 battleships, 1 tender, 7 submarines, 1 tug, 1 oiler	13
Brest	1 gunboat, 16 yachts, 3 tenders, 38 destroyers, 9 tugs, 1 station ship, 4 steam barges, 4 barges, 9 mine sweepers	85
Cardiff	1 tender, 1 refrigerator hulk, 55 colliers	57
Gibralter	2 cruisers, 4 gunboats, 5 coast guard cutters, 9 yachts, 1 tender, 6 destroyers, 18 chasers	45
Genoa	2 tugs	2
Azores	2 yachts, 1 tender, 1 oiler, 2 mine sweepers, 5 submarines, 1 tug	12
Grand fleet	5 battleships	5
Murmansk	1 cruiser (also 3 Russian destroyers)	1
Mine force	1 tender, 10 mine layers, 2 mine sweepers	13
Southampton	4 transports	4
Plymouth	1 tender, 2 destroyers, 36 chasers	39
Corfu	1 tender, 36 chasers	37
Liverpool	1 oiler	1
	Grand Total Naval Vessels in European Waters	373

MILES STEAMED BY UNITED STATES NAVAL VESSELS IN WAR ZONE.

These figures of average miles steamed per month by U. S. Forces in European Waters are very approximate and all a minimum:

	Miles.
Destroyers	275,000
Miscellaneous patrol craft	120,000
Mine Sweepers	10,000
Minelayers	10,000
Battleships & Submarines	90,000
Subchasers	121,000
Total	626,000

III. PERSONNEL.

The following table shows the Naval Personnel, actually in European War at the beginning of each quarter, since April 26th, 1917, and the quarterly increases:

Date.	Total officers serving.	Total men serving.
April 6, 1917	5	
July 1, 1917	214	1,840
October 1, 1917	629	9,544
January 1, 1918	1,482	22,724
April 1, 1918	2,072	31,080
July 1, 1918	3,135	47,685
October 1, 1918	4,969	75,742

The increase in the personnel through each quarter is shown in the following table:

Quarter ending.	Increase in officers.	Increase in men.
June 30, 1917	209	1,840
September 30, 1917	415	7,740
December 31, 1917	853	13,180
March 31, 1918	590	8,356
June 30, 1918	1,063	16,605
September 30, 1918	1,834	28,057
Average per quarter	820	12,622

At the cessation of hostilities there were approximately 81,000 officers and men serving in Europe. This represents about 15% of the total Naval Personnel, which is 31,186 officers and 506,996 men.

At Queenstown, 289 officers and 3,892 men have been received and trained, releasing 157 officers and 1,504 men to return to the United States for new construction, etc.

At Brest 6,423 untrained men have been received for training and 385 officers have reported for the same purpose. Brest has sent home 103 officers and about 900 men.

A further large share of this sort of activity has been carried on by the Atlantic Fleet in home waters. The battleships and cruisers were turned into a huge training school. The raw recruits were received on board the ships, when, in the early stages of our participation, the ships were stripped of experienced men for immediate service in Europe. As fast as these new men could be given short and hard course of training, they were at once sent to active duty on transports, merchant craft and new construction, their places being taken by more new recruits.

TRAINING.

All ships in European Waters, and particularly destroyers, were necessarily used for purposes of training inexperienced officers and men while carrying on their actual operations against the enemy. Anyone familiar with the problems of naval efficiency is aware that one of the greatest requisites is permanence of personnel. The unusual expansion of the United States Navy during the war, which involved absorbing new personnel, the majority of which had never been at sea before at all, presented a problem to the United States Navy much greater and more difficult than was presented to any of the older naval services. It was realized that in order to ensure the maximum efficiency of the service as a whole it was necessary to distribute skilled personnel as widely as possible. For example, the destroyers in European Waters were all fitted to carry an excess of both officers and men. As rapidly as possible nucleus crews were

formed consisting of officers and the principal skilled ratings; that is, a representative from each activity on board the destroyer. These nucleus crews were sent back to the United States after experiences in the war zone for the purpose of commissioning new destroyers as rapidly as they were delivered by the builders.

This problem involved a heavy handicap to the ships in the war zone and such work as they accomplished is deserving of greater credit than that they would ordinarily have maintained if they had been allowed to retain permanent crews.

In addition, the Navy established in various parts of the United States schools for the training of officers and men destined for service in the growing merchant marine.

The exact figures of men so trained are not at this time available, but are unquestionably large.

CASUALTIES.

	Officers.	Men.	Total.
Dead	79	950	1,029
Prisoners of war	6	15	21

IV. MAJOR ACTIVITIES.

(a) ESCORT DUTY.

The principal American Naval Bases at Brest, Queenstown and Gibraltar were established for the purpose of providing escorts for troop ships and merchant shipping through the danger zone. When the Armistice with Germany was signed there were at these Bases 105 U. S. Naval Vessels suitable for escort duty. They included:

2 Cruisers
68 Destroyers
25 Armed Yachts
5 Gunboats
5 Coast Guard Vessels.

Atlantic Convoy Statistics.

(Including all convoys that traverse any part of the Atlantic and excluding all Coastal and Scandinavian convoys.)

ATLANTIC CONVOYS.

	Convoys.	Ships convoyed.
Organized by British Authorities	1,124	16,530
Organized by United States Authorities	350	2,123
Totals	1,474	18,653

The forces based at Queenstown and Brest escorted a total of 710 convoys, including a total of over 7,000 ships, and in addition escorted single ships numbering more than 600.

From Brest the forces supplied 90% of the escort for 350 convoys. At Queenstown the forces supplied 91% of the escort for 360 convoys.

The Queenstown forces in some cases escorted convoys only as far as a point just west of the Scilly's, where British met them and escorted units of the convoys to various ports. It is therefore impossible to reach a positive conclusion as to the share of the escort work performed by the U. S. Navy.

A conservative estimate based on the best available figures covering all troop and cargo convoys, both Allied and neutral, gives percentage as follows:

Great Britain	70 per cent.
United States	27 per cent.
France	3 per cent.

Ocean Escort.

Convoys at sea in the Atlantic were escorted by cruisers as protection against attack by enemy raiders.

United States Ocean escort vessels based at Gibraltar escorted 200 convoys out of a total of 273 between Gibraltar and the United Kingdom, or 73%.

American cruisers and other warships based on America have acted as ocean escort for 166 convoys from America to England and France. Of these, 84 were troop convoys. It is estimated that these escort vessels steamed about one million miles on this duty. Ocean escort vessels for protecting Allied shipping in the Atlantic were provided as follows:

Great Britain	61
United States	45
France	4

TABLE SHOWING INCREASE OF ESCORT DUTY PERFORMED BY AMERICAN NAVAL FORCES.

Period.	Brest.[1]		Queenstown.		Gibralter.[1]	
	Convoys.	Single ships.	Convoys.	Single ships.	Convoys.	Single ships.
Apr. 6, 1917, to July 30	.....	.....	11	69	.....	.....
July 1 to Sept. 30	.....	.....	65	30	.....	.....
Oct. 1 to Dec. 31	(App.) 41	.....	71	30	49	9
Jan. 1, 1918, to Mar. 31	54	.....	64	60	76	30
Apr. 1 to June 30	90	.....	61	60	152	30
July 1 to Sept. 30	98	.....	58	48	167	18
Oct. 1 to Nov. 11	67	.....	30	18	9	12
Total	350	.....	360	315	453	99

Brest Forces supplied 90% of the escorts for the convoys they escorted.

Queenstown Forces supplied 91.5% of the escorts for the convoys they escorted.

Gibralter Forces supplied 50% of the escorts for the convoys they escorted.

Mediterranean Convoy Statistics.

The total number of ships convoyed in local Mediterranean traffic was 10,676. The American Forces at Gibralter have supplied 25% of the escorts for 383 local convoys in the Western Mediterranean, which include approximately 4,245 ships. Therefore they have accomplished approximately 11% of the escort work for local Mediterranean convoys.

(b) AMERICAN TROOP TRANSPORT FOR 1918.

TROOPS LANDED EACH MONTH IN EUROPEAN PORTS.

1918	Total troops arrived in Europe during month.	Troops carried in British ships or ships controlled by British.	Troops carried in American ships.	Troops landed in England.
January	40,714	20,014	20,700	20,014
February	27,373	7,410	19,963	7,410
March	72,596	27,000	45,600	35,242
April	104,756	38,000	65,217	44,301
May	232,964	122,771	110,167	110,144
June	229,883	130,355	96,001	122,771
July	317,864	195,819	111,909	178,204
August	258,199	166,452	88,230	159,529
September	311,219	175,721	121,547	157,973
October	202,979	121,034	74,273	97,304
November	97,303	42,304	49,932	36,796
	1,895,850	1,046,880	803,539	969,688

[1] Base established in July 1917.

Total troops arrived to end of September 1918 1,766,160
Total troops arrived to end of November 1918 2,066,442
Total troops lost at sea 747

	By British ships	By American ships	By French
Percentage of United States troops carried	54	44	2
Percentage of United States troops escorted	38	62	.....
Losses under U. S. N. Escort	.....	None.	.....

The four American Cross-Channel transports plying between Southampton and Havre have carried 230,000 troops of all nationalities since they began their duty.

(c) ENCOUNTERS WITH ENEMY SUBMARINES.

It can be easily understood that it was very difficult during the war to verify the results of attacks on enemy submarines. A track

of enemy submarines, while operating at sea, was kept by plottings of sightings and sinkings, by intercepted wireless messages, and by other information from Secret Service sources. However, unless prisoners or unmistakable wreckage was obtained following an attack it was practically impossible to definitely determine the results of the attack. Report of all attacks by United States Navy vessels were submitted to the British Admiralty the same as in the case of British ships and awards of British Admiralty were accepted.

A total of over 256 attacks by United States vessels occurred. In 183 of these cases there was definite chart evidence of a submarine in the vicinity. In the other cases doubt existed.

It is often very difficult to determine the result of an attack, and the official classification is sometimes found to be in error; therefore the following figures are certainly not exaggerated and may be somewhat under-estimated. United States vessels have been officially accredited with 24 successful attacks on enemy submarines. The degree of success in these attacks varies between "Slightly damaged" and "Known sunk."

A list of the ships participating in these attacks, the names of their commanding officers, and the classification of the attacks follows:—

O'Brien, Lt. Comdr. C. A. Blakely, 16 June, 1917. "Possibly slightly damaged." (Adm. Class.)

Trippe, Lt. Comdr. Giffen, 9th July, 1917. "Possibly slightly damaged." (Adm. Class.)

Warrington, Lt. Comdr. G. W. Kenyon, 13 July, 1917. "Possibly slightly damaged." (Adm. Class.)

Jenkins, Lt. Comdr. H. D. Cook, 17 July, 1917. "Possibly slightly damaged." (Adm. Class.)

Wadsworth, Lt. Comdr. J. K. Taussig, 21 July, 1917. "Possibly slightly damaged." (Adm. Class.)

Cummings, Comdr. George Neal, 26 July, 1917. "Possibly slightly damaged."

Wilkes, Lt. Comdr. J. C. Fremont, 26 July, 1917. "Possibly slightly damaged." (Adm. Class.)

Wadsworth, Comdr. J. K. Taussig, Lt. Comdr. Giffen, 29 July, 1917. "Possibly slightly damaged." (Adm. Class.)

Benham, Lt. Comdr. J. R. Gay, 30 July, 1917. "Probably seriously damaged." (Adm. Class.)

Parker, Comdr. W. Brown, 3 August, 1917. "Possibly seriously damaged." (Adm. Class.)

Jacob Jones, Lt. Comdr. D. W. Bagley, 5 September, 1917. "Possibly slightly damaged." (Adm. Class.)

McDougal, Comdr. W. T. Conn, 9 September, 1917. "Possibly slightly damaged." (Adm. Class.)

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Davis, Comdr. W. V. Tomb, 21 September, 1917. "Possibly slightly damaged." (Adm. Class.)

Pathfinder, 27 September, 1917. "Possibly slightly damaged." (Adm. Class.)

Conyngham, Comdr. A. W. Johnson, Oct. 19, 1917. "Possibly slightly damaged." (Adm. Class.)

Fanning, Lieut. A. S. Carpenter; *Nicholson*, Comdr. F. D. Berrien; 17 November, 1917. "Known sunk—*U-58*." (Adm. Class.)

Noma, Lt. Comdr. L. R. Leahy; *Wakiva*, Lt. Comdr. G. E. Davis; *Piqua* (ex *Kanawha II*), Lt. Comdr. H. D. Cooke; 28 November, 1917. "Probably seriously damaged."

Allen, Comdr. H. D. Cooke, 2 February, 1918. "Possibly slightly damaged." (Adm. Class.)

Reid, Lt. Comdr. C. C. Slayton, 18 March, 1918.

Isabel, Lt. Comdr. H. E. Shoemaker. "Possibly slightly damaged."

Stewart, Lieut. H. S. Haislip, April 23, 1918. "Probably seriously damaged."

Porter, Lt. Comdr. W. H. Lee, April 28, 1918. "Probably seriously damaged." (Adm. Class.)

Patterson, Lieut. S. S. Lewis; *Beale*, Lt. Comdr. C. T. Blackburn; *Burrows*, Lt. Comdr. H. V. McKittrick; *Allen*, Comdr. H. D. Cooke; 19 May, 1918. "Possibly slightly damaged." (Adm. Class.)

Christabel, Lt. Comdr. M. B. McCord, 21st May, 1918. "Submarine interned at Santander, *U. C. 56* as result of attack." (Adm. Class.)

Sydonia, Lt. Comdr. R. P. McCullough; H. M. S. *Basilisk;* 8th May, 1918. "Known sunk—*U. B. 70.*" (Adm. Class.)

Sterrett, Lt. Comdr. A. S. Farquhar, 1st June, 1918. "Possibly slightly damaged."

U. S. Submarine *A. L. 2*, Lt. P. F. Foster, July 10, 1918. "Known sunk—*U. B. 65.* (Adm. Class.)

Sub-Chasers, *Corfu*, Ensign G. J. Luvy, U. S. N. R. F. 95; Ensign E. Hazard, U. S. N. R. F. 179; Ensign J. M. Beverly, U. S. N. R. F. 338; 10 July, 1918. "Possibly sunk." (Adm. Class.)

Sub-Chasers, *Plymouth*, 84 Ensign E. F. Williams, U. S. N. R. F.; 85 Ensign A. B. Baker, U. S. N. R. F.; 86 Ensign G. H. Lane, U. S. N. R. F.; 10 July, 1918. "Possibly slightly damaged." (Adm. Class.)

Tucker, Lieut. Comdr. W. H. Lassing, 8 August, 1918. "Possibly sunk."

Paducah, Capt. W. T. Wheeler, C. G., 9 September, 1918. "Possibly slightly damaged." (Adm. Class.)

In addition it is known that at least six enemy submarines have been destroyed in the Northern Mine Barrage, of which two were blown up in Area A, laid by the United States Mine Force.

V. UNITED STATES VESSELS AND VESSELS IN SERVICE OF THE UNITED STATES LOST OR DAMAGED SINCE THE UNITED STATES ENTERED THE WAR.

Name of ship.	Particulars.
Grace	Tanker, torpedoed and sunk off Azores 12 July 1917.
Campana	Cargo, torpedoed and sunk in English Channel 4 Oct. 1917.
Lewis Luckenbach	Coal, torpedoed and sunk in English Channel 13 Oct. 1917.
Antilles	Troop Transport, torpedoed, sunk S. W. of Ireland 17 Oct. 1917.
Mohawk	Revenue Cutter, sunk in collision off New York 1 Oct. 1917.
Rochester	Cargo, torpedoed N. E. Irish Coast 2 Nov. 1917, reached port.
Alcedo	Armed Yacht, torpedoed and sunk in Bay of Biscay 5 Nov. 1917.
Chauncey	Destroyer, sunk in collision off Gibralter 19 Nov. 1917.
Actaeon	Cargo, torpedoed and sunk in Bay of Biscay 24 Nov. 1917.
Jacob Jones	Destroyer, torpedoed and sunk off Scillies 6 Dec. 1917.
Cassin	Destroyer, torpedoed off Queenstown, reached port Oct. 1917.
Owasco	Torpedoed and sunk off French coast.
F-1	Submarine, sunk in collision 17 Dec. 1917.
Harry Luckenbach	Coal, torpedoed and sunk in Bay of Biscay 6 Jan. 1918.
Bauman	Armed trawler, wrecked off French coast 13 Jan. 1918.
Tuscania	British ship carrying American troops, torpedoed and sunk in North Channel 5 Feb. 1918—U. S. Troop Casualties 210.
A. A. Raven	Coal, torpedoed and sunk in English Channel 14 Mar. 1918.
Atlantic Sun	Tanker, torpedoed and sunk in North Channel 18 Mar. 1918.
Chattahoochee	Cargo, torpedoed and sunk in English Channel 23 Mar. 1918.
Cyclops	Fuel ship, overdue in W. Atlantic; considered a marine casualty about end of March 1918.
Long Beach	Cargo, wrecked off French coast 3 April 1918.
Lake Moor	Cargo, torpedoed and sunk in North Channel 11 Apr. 1918.
Florence H.	Cargo, sunk by explosion (cause unknown) in Quiberon Harbour 17 April 1918.
Westerly	Cargo, sunk by explosion (cause unknown) off Brest 27 April 1918.
Wakiva II	Yacht, sunk in collision in Bay of Biscay 22 May 1918.
Neches	Cargo, in collision in English Channel 15 May 1918—reached port.
William Rockefeller	Tanker, torpedoed and sunk in North Sea, 20 May 1918.
Moldavia	British ship carrying American troops, torpedoed and sunk in English Channel 23 May 1918; U. S. troop casualties, 56.
J. W. McCulloch	Coal, sunk by mine off French Coast 18 May 1918.
President Lincoln	Troop transport; torpedoed and sunk S. W. of Ireland 31 May 1918.
Californian	Cargo, sunk by mine off French Coast 22 June 1918.
Schurz	Gunboat, sunk in collision 21 June 1918.
Covington	Troop ship, torpedoed and sunk in Bay of Biscay 1 July 1918.
San Diego	Cruiser, sunk by mine off Fire Island 19 July 1918.
Westover	Cargo, torpedoed and sunk S. W. of Ireland 11 July 1918.
Tippecanoe	Cargo, torpedoed and sunk S. W. of Ireland 26 July 1918.
Osterdijk	Cargo, sunk in collision N. W. of Azores, 10 July 1918.
Berwind	Cargo, sunk by explosion (cause unknown) off French Coast, 3 August 1918.
Lake Portage	Cargo, torpedoed and sunk off French Coast 3 Aug. 1918.
Lake Eden	Army Coal, torpedoed and sunk in Bristol Channel 21 Aug. 1918.
Montanan	Cargo, torpedoed and sunk S. W. of Ireland 16 Aug. 1918.
Cubore	Cargo, torpedoed and sunk S. W. of Ireland 15 Aug. 1918.
Westward Ho	Cargo, torpedoed S. W. of Ireland 9 Aug. 1918; reached port.
Westbridge	Cargo, torpedoed S. W. of Ireland 16 Aug. 1918; reached port.
Joseph Cudahy	Cargo, torpedoed and sunk S. W. of Ireland Aug. 17, 1918.
Dora	Cargo, torpedoed and sunk S. W. of Ireland 4 Sept. 1918.
Ratuxent	U. S. Tug, sunk in collision N. E. of Scotland 5 Sept. 1918.
Lake Owen	Army coal, torpedoed and sunk in Bristol Channel 3 Sept. 1918.
Mount Vernon	Troop ship torpedoed in Bay of Biscay 5 Sept. 1918. Reached port.
Dueva Ventura	Cargo, torpedoed and sunk S. W. of Ireland 16 Sept. 1918.
Tampa	Revenue Cutter, sunk by explosion (cause unknown) 26 Sept. 1918.
Ticonderoga	Cargo sunk by gunfire in mid-Atlantic 30 Sept. 1918. U. S. Troop Casualties 125.
Westgate	Cargo, sunk in collision N. W. of Azores 7 Oct. 1918.
Shaw	Destroyer, in collision in English Channel 11 Oct. 1918. Reached port.
Lake Borgne	Cargo, wrecked off Brest 22 Oct. 1918.
Otranto	British ship carrying American troops, sunk in collision on North Channel; U. S. Troop casualties 356.
Lake Damita	Cargo, wrecked off Brest 6 November 1918.
Manley	Destroyer, in collision with H. M. S. *Montague*, damaged by explosion of depth charges 19 March 1918.

VI. BRIEF HISTORICAL SKETCHES.

NAVAL GUN BATTERIES.

The long range naval guns have demonstrated that they are among the strongest guns on the Western Front. The extreme range of these guns is 42,500 yards, or 24 sea miles, and it is particularly noteworthy that the shooting done was remarkably accurate for such a long range.

Each gun is a complete self-sustaining unit composed of 8 cars and locomotives. The cars carry the ammunition and provide all accommodations for the naval personnel who man the gun.

These guns were originally built for battle cruisers, but on December 7, 1917 the Bureau of Ordnance recommended that these 14″/50 calibre guns be placed on railway mountings for use in France.

The Naval Gun Factory, Washington, D. C., prepared the plans and specifications for the railway batteries, which were finally submitted January 25, 1918.

The gun cars and locomotives were built by the Baldwin Locomotive Works, and the cars and other equipment by the Standard Steel Car Company. Work was carried on at extraordinarily high speed, day and night, without stop. The first gun was completed on April 25, 1918 and taken to Sandy Hook for test firing. The last gun was delivered on May 25, 1918. Thus, in a little less than 6 months from the date the Navy Department decided to mount these guns for land use, the 5 batteries were completed ready for shipment.

On May 15, 1918, a cable was sent to General Pershing offering the Naval Railway Batteries for use in France. The offer was accepted, requesting that the material be shipped to St. Nazaire as soon as possible. The first shipment arrived at St. Nazaire, France, July 8, 1918. The first gun was mounted August 5, 1918, and arrived at its firing point August 27, 1918.

On August 13, 1918, a telegram was received from the Commanding General, A. E. F., to despatch 2 of the guns at the earliest possible date for an important special mission. This mission was to fire on the German long range gun which was bombarding Paris. Nos. 1 and 2 Guns left St. Nazaire on August 17 and 18, respectively, but the long range gun was moved before the Naval guns could get into position.

Personnel: Officers, 30. Men, 486. Total cost of the 5 Naval Gun Batteries, $3,337,970.00.

SUMMARY OF FIRING.

Battery.	Firing points.	Objective.	Date.	Rounds.
1	Niusemont	Test firing	Sept. 2	8
2	Rathondes	Tergnier	Sept. 6	1
2	Fonteboy-Ambleny	Besny-Loisy	Sept. 14–15	22
1	Soissons	Laon	Sept. 28–Oct. 12	204
2	Jussy	Mortiers	Oct. 11–13	34
3–4–5	Thierville	Longuyon	Oct. 23	3
3–4–5	do	Mangiennes	Oct. 29	30
2	Charny	Montmedy	Oct. 30–Nov. 1–2	49
3	Thierville	Longuyon	Oct. 30–31–Nov. 1–2	38
4	Charny	Louppy, Remoiville	Nov. 3	25
3	do	Louppy, Remoiville and Montmedy.	Nov. 4	56
3	do	do	Nov. 5–7–8–9	131
4–5	Thierville	Mangiennes and Longuyon.	Nov. 9–11	45
	Total			646

Note.—The last round fired by this battery was from gun No. 4, the shell dropping in Longuyon at 10:59 A. M., November 11th, one minute before cessation of hostilities.

NORTHERN MINE BARRAGE.

The laying of the Northern Mine Barrage is undoubtedly the largest single mining operation ever undertaken. The total barrage is approximately 250 miles long, 30 miles wide, composed of 15 strings of mines laid approximately 100 yards apart.

The laying of the barrage occupied 7 months and was nearly completed when hostilities ceased.

Although few concrete results can be credited to this great minefield, it is definitely known that at least six submarines were seriously damaged while crossing the barrage and it is possible that several submarines have been sunk, but owing to the difficulty of establishing these facts conclusively until more evidence is obtained, probably from a German source, these cases must still be considered as possibilities only.

There is no doubt that this barrage had a considerable moral effect on the German naval crews, for it is known that several submarines hesitated some time before crossing. Also reports from German sources are that the barrage caused no small amount of panic in some of the submarine flotillas.

It is also probable that the barrage played a part in preventing raids on Allied commerce by fast enemy cruisers.

Mining Bases.

Mine Base No. 17 Invergordon, Scotland.

Mine Base No. 18 Inverness, Scotland.

Mine Base No. 30 Bizerta, Tunis This base never was commissioned. Construction was under way at time of armistice signing.

Mining Personnel.

Bases 17, 18 and 30, at the time of the Armistice, had a total of 60 officers and 2,222 men, which included 322 men and 12 officers at Bizerta for construction purposes only.

Officers:	
Afloat	237
Ashore	60
Total	297
Men:	
Afloat	4530
Ashore	2222
Total	6752

No information as to number employed in manufacture in United States.

Minelaying Squadron.

Planters	10
Tugs	2
Carriers	23

Notes of Operations.

First U. S. Minelaying operations, Northern Barrage, June 8, 1918.

Average mines laid per trip, 4,343.

Total United States Mines laid, 56,447.

Last operation on October 26, 1918. Barrage not completed on account of cessation of hostilities. Layers were loaded and ready for fourteen excursions October 30, but did not go out. A field of 5,520 mines with a total length of 56 miles was laid in 3 hours and 51 minutes, or at the rate of 1,440 mines per hour. The general average of laying mines was 1,130 mines per hour.

Total cost of barrage	$48,275,000
Percentage of Northern Barrage laid by United States Forces	80%
Mine carriers used	23

Ships in Minelaying Squadron.

Mine Planters:	Date of Arrival in European Waters.
U. S. S. *Baltimore*	March 17, 1918.
U. S. S. *San Francisco*	May 26, 1918.
U. S. S. *Quinnebaug*	May 26, 1918.
U. S. S. *Housatonic*	May 26, 1918.
U. S. S. *Canonicus*	May 26, 1918.
U. S. S. *Canandaigua*	May 26, 1918.
U. S. S. *Roanoke*	May 15, 1918.
U. S. S. *Saranac*	June 29, 1918.
U. S. S. *Shawmut*	June 29, 1918.
U. S. S. *Aroostock*	June 29, 1918.

	Date of Arrival in European Waters
Tugs (Minesweeper):	
U. S. S. *Patuxent*	May 26, 1918.
U. S. S. *Patapsco*	May 26, 1918.
Tender:	
U. S. S. *Black Hawk*	June 29, 1918.

THE SUB CHASERS.

The sub chasers are 110 ft. gasoline boats, which were built after the United States entered the war. They displace 80 tons and carry a 3″ gun and 12 depth charges, and a crew of 2 officers and 23 men.

One hundred and twenty of these craft crossed the Atlantic by way of Bermuda and the Azores, proceeding in convoys of 12 to 24 as they were fitted out and ready. The length of the trip necessitated fuelling the boats at sea, and towing for part of the trip.

Thirty-six chasers operated from Corfu, Greece, forming part of the barrage across the Straits of Otranto. Others operated from Plymouth, protecting the western end of the channel and hunting submarines there. A third detachment operated from Queenstown, Ireland, using Wexford and Holyhead as auxiliary Irish sea bases, and Berehaven as an auxiliary base for the south cost of Ireland. Finally when Austria signed an armistice, 18 of the chasers which were at the Azores en route from the United States were ordered to Gibraltar, where they did valuable work against the German submarines, which were forced to leave the Mediterranean for lack of bases.

Operations were essentially different from most other vessels. They carried as part of their equipment American listening devices, so that they were able to execute attacks on submarines submerged. At night they drift noiselessly, and with their listening devices manned, could hear the submarines a considerable distance, depending upon the speed at which it was going. Many of their best attacks were initiated in this fashion, for at night the submarines lost the protection of sight, while remaining equally vulnerable to attacks by sound.

By day they patrolled, stopping at intervals to listen for submarines submerged. This form of patrol did not result in as many attacks as the night work, though several good encounters took place. In addition to their strictly anti-submarine work, they aided frequently in the forming of convoys, assisted torpedoed vessels to reach port and destroyed drifting mines.

Perhaps the most spectacular performance of the chasers was their participation in the bombardment of Durazzo. In this affair they were the covering force for the Italian and British vessels engaged in the bombardment. One division was between the larger vessels and the Austrian forts, so that they were between the fires during the most of bombardment. They escaped unscathed and had the distinc-

tion of beating off a submarine attack on the larger vessels. The Italian Naval General Staff expressed its appreciation of the chasers' work, and credited them with sinking 2 enemy submarines. The Commander of British Adriatic Force in expressing his appreciation in a telegram to Admiral Sims credits them with destroying definitely one submarine, and damaging and probably destroying another. He added, " They thoroughly enjoyed themselves."

Subsequently the chasers participated in the taking of Durazzo and did valuable work along the Dalmatian coast in protecting our interests there, and assisting in the maintenance of order in the occupied territory.

The following table gives a summary of the chaser activities. In nearly all the attacks listed 3 chasers participated, as this was the usual hunting unit, though there are several single boat attacks and one attack lasting for 36 hours in which 9 boats participated.

SUMMARY OF SUB-CHASER OPERATIONS.

	Portland.	Corfu.	Plymouth.	Queenstown.	Gibraltar.	Total.
Commenced operations	5-17-18	6-12-18	6-12-18	9-20-18	7-17-18	.....
Ceased operations	6-15-18	11-11-18	11-11-18	11-11-18	11-11-18	.....
No. subchasers	6	36	24 to 86	30	18	176
No. sound contacts	1	12	25	6	4	48
No. sight contacts	.....	3	6	2	.....	11
No. sight and sound contacts	3	2	6	1	1	13
Total No. contacts	4	17	19	9	5	54
Depth charges used in attack	17	139	220	79	22	477

SUBMARINE DIVISION FIVE.

During the summer of 1917 the Navy Department, acting upon the desire of the British Government, ordered a flotilla of United States submarines to prepare for duty in European waters. This flotilla was organized in two divisions as follows:—

Division 4.—U. S. S. *Tonopah*, Tender. U. S. S. *K–1*, *K–2*, *K–5*, *K–6*, *E–1*.

Division 5.—U. S. S. *Bushnell*, Tender. U. S. S. *AL–1*, *AL–2*, *AL–3*, *AL–4*, *AL–9*, *AL–10*, *AL–11*.

After some changes, alterations and replacements in the submarines, the U. S. S. *K–1*, *K–5*, and *K–6* left Provincetown on 13th October 1917, U. S. S. *Bushnell* and *Chicago* having each 2 submarines in tow. Halifax was reached without incident, and the group again got underway on 16th October for Ponta Delgada. On 22nd October the *Chicago* parted company and returned to the United States after having towed 2 submarines 1,500 miles. On October 27th the group arrived at its destination, after having passed through a succession of winter gales and storms. U. S. S. *Bushnell* returned to the United States 28th October and *K* boats of Division 4 began their actual war work at once.

December 4, 1917, U. S. S. *Bushnell* and the tugs *Conistoga*, *Genesee* and *Lykens* sailed from Newport direct for Ponta Delgada with the 7 *L*-boats of Division 5 and the *E–1* of Division 4 in tow. On 7th December a hurricane lasting 48 hours was met, which resulted in the vessels of the expedition becoming separated. One tug and one submarine returned to the United States, but the others finally reached the Azores after more heavy weather. The *E–1* was left with her division at the Azores and the *Bushnell* with one tug and 6 submarines sailed for Queenstown. In severe weather 2 submarines became separated from the division, one returning to the Azores and the other (*L–10*) reaching Bantry Bay by herself. The *Bushnell*, one tug and the other 4 submarines arrived at Queenstown 27th January. These vessels remained at Queenstown until 5th February, when they sailed for Berehaven in Bantry Bay to begin training. The division was completed by the arrival on February 21st of the two submarines which had separated from it on passage and returned to the United States and the Azores respectively. Training and preparation for patrol occupied until 6th March, when 2 United States submarines left on regular 8-day patrol, and British units left Berehaven for other bases, leaving Bantry Bay Base completely to the U. S. Naval Forces. From March 6th until all submarines were recalled from sea just before the signing of the armistice, the work of the division was carried out with almost complete regularity, the plan being for 3 submarines to be sent in patrol each 8 days.

Enemy submarines were sighted by submarines of the division on 21 different occasions, conditions allowing 4 attacks with torpedoes to be made. No submarines of the enemy were sunk, though by indirect action one was accounted for; an enemy torpedo fired at *L–2* making an erratic run and curving struck and sunk the firing submarine. The serious hampering of the enemy in his work is the important item in the results by Division 5 in its operations.

STATISTICS OF THE WORK OF THE DIVISION.

	A.L.-1	*A.L.-2*	*A.L.-3*	*A.L.-4*	*A.L.-9*	*A.L.-10*	*A.L.-11*
Number days at sea	115.9	125.4	134.0	90.2	108.0	136.6	103.2
Number days on patrol	76.5	83.0	89.0	60.0	62.0	95.0	78.0
Miles on surface	12,072.3	17,562.3	12,093.8	10,871.6	12,251.8	15,617.3	13,066.3
Miles submerged	2,353.0	1,879.0	3,120.0	2,126.0	2,058.6	2,891.8	1,906.8
Hours submerged	1,245.4	1,163.1	1,669.2	1,285.2	954.8	1,794.5	1,597.0
Hours charging batteries (starboard)	265.6	343.6	348.0	207.1	214.7	287.7	227.6
Hours charging batteries (port)	312.2	306.1	332.0	237.4	181.3	275.9	227.5
Fuel used—gall	50,413 0	66,076.0	55,373.0	42,216.0	52,008.0	58,749.0	57,545.0
Lubricating oil used—gall	12,956.0	15,379.0	12,767.0	10,944.0	16,084.0	19,765.0	13,272.0
Exercise torpedo runs	12	10	11	14	8	15	12
Torpedoes lost	1	1	.....	.....	.....	2	.....
Torpedoes wrecked	.....	1	.....	.....	1	.....	.....
Number times enemy sighted	3	5	2	5	1	2	3
Times enemy attacked with torpedoes	1	.....	.....	2	.....	.....	1
Number torpedoes expended	4	.....	.....	5	.....	.....	2

ARMY COAL TRADE.

Late in the summer of 1917 the U. S. Army coal situation in France became a matter of grave importance and request was made of the Navy to aid in the crisis by releasing some Navy colliers for that service between Cardiff and the French Ports. On October 4, 1917, the U. S. Army had 3 chartered boats of 9,200 tons combined, on this work. The first Navy vessel to engage in this service was the U. S. S. *Bath*, which sailed from Cardiff on October 5th with 3,309 tons of coal. From that date to the 1st December 1918 Navy colliers made 30 trips, carrying 96,000 tons of coal to French ports for the Army.

In July 1918 it was decided that the first 19 vessels being operated by the Army in this trade should be taken over and manned by the Navy as soon as possible; in addition the Navy was requested to follow the same procedure with the next two lots of 20 "Lake" boats each, as the opportunity should permit. It was agreed that these vessels were to be operated for the benefit of the Army, and that they should have cognizance over their cargoes, ports of loading and discharge; the Navy was to try to cut down their turn about and prevent any waste of time arising from inefficient management.

On August 16th there were 29 U. S. steamers, 4 Navy colliers and 76,000 tons of Swedish time charters engaged in the trade, and on the 26th authority was obtained to enroll any suitable personnel on the ships so that the work of commissioning the ships to be taken over by the Navy could proceed as rapidly as possible.

Coal Trade Bases.

(a) Cardiff (Sub-stations indicated below in relative order of their importance):

Date established.	Where.	Purpose.
Oct. 1, 1918	Cardiff Docks	To expedite repairs and to report arrival and departure of vessels in Army Coal Trade.
Oct. 11, 1918	Barry	
Establishment contemplated	Penarth	
Nov. 20, 1918	Newport	
Oct. 15, 1918	Swansea	

(b) Cardiff: *Personnel* (*inclusive of sub-stations*):

Officers (afloat and ashore):

August 1918	100
September	268
October	608
November	782
	1,758

Enlisted personnel (November, 1918):

Afloat	3,230
Base	433
Available	344
Sick	94
(The only enlisted personnel figures available.)	4,101

Vessels in Coal Trade.

(*a*) *Vessels commissioned:*

Before entering Coal Trade	17
In coal trade prior to organization of base, later commissioned	29
Reporting after commencement of Base	19
Total in Coal Trade November, 1918	65

(*b*) *Total number of trips made by month* since trade was established are not available. They are, however, given for the months of October and November:

Total number of trips from Cardiff to France, and return, for month of October	42
Total number of trips from Cardiff to France, and return, for month of November	36

(*c*) *Turn-around of chartered vessels by months:*

Total round trips from Cardiff and return in October	15
Total round trips from Cardiff and return in November	27

(*d*) *Tons of coal transferred to France by months since Base was established:*

Week ending—	Tons.
September 8	30,792
September 15	23,338
September 22	29,018
September 29	27,760
October 6	50,230
October 13	46,951
October 20	35,886
October 27	35,385
November 3	46,099
November 10	37,437
November 17	29,903
November 24	38,452
December 1	32,636

Total tonnage here given is total carried in Naval and chartered vessels combined.

Since the establishment of this Base, only 2 of the vessels attached to it have been lost. They were the *Lake Borgne* and *Lake Damita.* They were lost through ordinary navigational hazards and their loss is not attributable to enemy action.

Base 29, Cardiff, was established on September 24, 1918, and taken over by Rear Admiral Philip Andrews.

The enormously increased demands of the Army were planned to be met by a fleet of 70 colliers, of which 53 were actually commissioned at the cessation of hostilities (6 having been commissioned at Brest in September and 17 at Cardiff in October). On October 25th

the average turn about was 30 days. The needs of the Army necessitated an attempt at cutting this down appreciably and it was estimated that a turn-about of 18 days might be realized if delays in French waters could be avoided.

From October 1917–March 1918 there were 16 round trips; from April 1918–September 1918, 144; in October there were 53 sailings and in November 28. Of these total sailings, 8 ships were sunk and one badly damaged.

ACTIVITIES OF U. S. BATTLESHIPS IN EUROPEAN WATERS.

BATTLESHIP DIVISION NINE—U. S. S. *NEW YORK*, FLAGSHIP.—Rear Admiral Hugh Rodman, Commanding; assigned to the Grand Fleet 9th December 1917 and designated:

THE SIXTH BATTLE SQUADRON.

Ship.	Date arrived.	Officers.	Enlisted men.
New York	6 December 1917	73	1,418
Florida	6 December 1917	66	1,270
Wyoming	6 December 1917	71	1,628
Texas	11 February 1918	78	1,472
Arkansas	25 July 1918	67	1,581
		355	7,369

Note: Division Nine upon arrival in European Waters 6th December 1917 consisted of the *New York*, *Florida*, *Delaware* and *Wyoming*. *Delaware* with 66 officers and 1,190 men, having been relieved by the *Arkansas*, sailed for the United States on 30 July 1918.

The *Texas* was added to the original 4 ships of the Division in order that there might be 4 ships continuously in the battle line and at the same time allow for necessary repairs.

The *Nevada* was detached from Battleship Division Six and joined Division Nine on 23 November 1918 to relieve the *Florida*. However, she is being held with the Division temporarily pending further instructions.

Encounters With Enemy Submarines by Battleships.

Between the dates of their arrival in European Waters and signing of the Armistice, U. S. Battleships were attacked 6 times by enemy submarines, and on one occasion the *New York* collided with a submarine. The following is a brief summary of the reports of these encounters:

Florida, *Delaware 8 February*, *1918*.—While maneuvering off the Norwegian Coast (exact position not stated) awaiting a return convoy, a submarine was sighted; 4 torpedoes were fired at the *Florida*

and 2 at the *Delaware*. Both ships successfully maneuvered to avoid being hit. Two depth charges were dropped by destroyers.

Texas, 27 April 1918.—At 12.47 p. m. in 56° 56′ N. 0° 40′ W. *Texas* sighted a periscope and opened fire. Depth charges were dropped by 2 destroyers, neither of which saw the submarine. No sign of damage.

New York, Delaware, Florida, Wyoming, Texas, 30 June 1918.—First attack. At 1619, Division in line abreast in open order, periscope was reported by the *Wyoming*, and was also seen by the *Parker* (destroyer). *Delaware, Florida*, and *Wyoming* opened fire. Destroyers dropped 6 depth charges as follows: *Salmon* 1, *Parker* 3, *Radstock* 2. *Radstock* remained in vicinity for half an hour but saw nothing further.

Second attack. At 1726 in Lat. 58.44 N. Long. 2.34 E. *Delaware* opened fire on submarine reported astern. Destroyers did not see periscope. Ten depth charges were dropped as follows: *Salmon* 4, *Parker* 2, *Sable* 3, *Rocket* 1.

Arkansas, 28 July 1918.—At about 9.00 P. M., Lat. 57° 55′ N. Long. 0° 05′ E., sighted periscope and opened fire with port sky gun, meanwhile going to "emergency full speed ahead" and using rudder to bring object fired at ahead. A torpedo wake was sighted running towards the ship, which she avoided by swinging to the left.

At 5.42 P. M. while the *New York* was leading the Division into Pentland Firth, her position then being Lother Rock Beacon 17°, Muckle Skerry Light 122°, Strome Light 257°, Swona Light 302°, and while turning with right rudder (hence stern swinging to port) a heavy underwater blow was felt on her starboard quarter, followed immediately by another, which damaged the ship's starboard propellor, breaking off two blades. After weighing all evidence in the case, such as position, depth of water, appearance of *New York's* hull when she was docked after the collision, etc., the Division Commander reached the conclusion that she had struck a submarine, which belief was verified by the report of the Board of Inquiry.

New York, 16 October 1918.—At 1.00 a. m. while en route from a northern base, at Rosyth, 3 torpedoes were fired at the *New York*, all passing ahead of her. The ship was making only 12 knots at the time, owing to damaged propellor, and the submarine no doubt misjudged her speed, which ordinarily would have been at least 16 knots. About this time a submarine was sighted and reported by a patrol in this vicinity.

Convoy Operations of Battleships.

United States Battleships comprising the Sixth Battle Squadron took their turn with other units of the Grand Fleet at convoy work

escorting convoys to and from the Norwegian Coast. Their performance of this duty is shown by the following table:

Date left base.	Date arrived at Norwegian coast.	Date left Norwegian coast with return convoy.	Date returned to base.
February 2	February 8	February 8	Feb. 10
March 8	March 10	March 11	Mar. 12
April 17	April 19	April 19	Apr. 20
June 30[1]	July 1	July 1	July 2
August 8[2]			Aug. 10

[1] Supported Mine Force from Base 18 on outbound trip.
[2] Supported Mine Force on both out and inbound trips.

Readiness for Battle.

The chief mission of United States Battleships in European Waters was, of course, to reinforce the British Grand Fleet and engage the German High Seas Fleet. For this purpose they were kept at the highest possible state of battle efficiency and were habitually kept on a 4 hours' notice. On several occasions they were put on 2½ hours' notice, and twice put to sea with the expectation of meeting the enemy. The following is a brief statement of these operations:

(1) On 23 April the Division (less *Wyoming*) was put on 2½ hours' notice. Sailed with the Grand Fleet at 3:00 p. m. 24th April, for active service against the enemy, it being understood that a large German Force was operating in the North Sea. They reached a strategic centre at 5:00 a. m. 25th April and occupied until orders were given to return to base. During the operations several floating mines were destroyed by gunfire; one of the British flagships was attacked by submarine, 2 torpedoes being fired at her; the submarine was attacked by destroyer with depth charges. The enemy was missed by about 4 hours. It was believed that he was out in force to attack the Norwegian convoy and supporting force. Grand Fleet returned to base, arriving at 7:45 a. m. 26th April; recoaled and remained on 2½ hours' notice.

(2) In the evening of 12th October report was received that 3 large enemy vessels had been sighted at 6 p. m. on Lat. 58° 08′ N., Long. 2° 43′ E., steering in a northwesterly direction. A convoy standing to the northward along the west coast of Scotland was warned to look out for an attack about 10:00 p. m. The Sixth Battle Squadron, a Battle Cruiser Squadron and Light Cruiser Squadron, accompanied by destroyer screens, left port shortly after midnight for assigned positions to the northward and westward of the Orkneys to scout and patrol the passage between the Orkneys and the Shetlands with the hope of intercepting and engaging the enemy. Weather was threatening, storm warning flying, blowing moderately; visibility decreasing until at daylight it was low and continued to decrease until noon, when it was reduced to about 2 miles.

On account of rough sea speed had to be gradually reduced from 18 to 12 knots owing to the inability of the destroyers to make more speed.

From assigned 5:00 a. m. position 14 October (55° 59′ N. 4° 30′ W.) the force scouted towards Fair Island Passage until noon, when it was directed to return to port. Arrived at 7:00 p. m. 14 October without having sighted the enemy.

During the night of November 20–21, the Grand Fleet got under way and proceeded to sea to meet and escort the German High Seas Fleet to an anchorage for internment. The American Battleship Force occupied a position in the middle of the North line between two British Battleship Squadrons.

In addition to operations mentioned above, United States Battleships have spent considerable time underway at target practice and various maneuvers. There are no reports on file at these Headquarters to show how many miles they have steamed or exactly how much time they have spent at sea.

Repairs on Battleships.

The following table shows the time each ship spent in dock for repairs and the nature of the repairs accomplished:

Ship.	Sailed from base.	Arrived at dock.	Nature of repairs.	Days in repairs.	Sailed from dock.	Arrived at base.
New York	Feb. 18	Feb. 19	Refit; paravanes installed	11	Mar. 2	Mar. 3
Delaware	Apr. 2	Apr. 2	Refit; paravanes installed	14	Apr. 16	Apr. 17
Wyoming	Apr. 23	Apr. 23	Refit; paravanes installed	16	May 9	May 9
Florida	May 10	May 10	Refit; paravanes installed	14	May 24	May 24
Texas	Oct. 20	Oct. 20	Refit	15	Nov. 4	Nov. 5
New York	Oct. 15	Oct. 16	Docking	3	Oct. 19	Oct. 19

BATTLESHIP DIVISION SIX, U. S. S. *Utah*, Flagship.—Rear Admiral T. S. Rodgers, Commanding; based at Berehaven.

Ship.	Date arrived.	Personnel.	
		Officers.	Enlisted men.
Utah	10 September, 1918	71	1,343
Nevada[1]	23 August, 1918	68	1,473
Oklahoma	23 August, 1918	63	1,406
		202	4,222

[1] Served as Flagship until arrival of *Utah*.

Nevada was detached from Division Six on the 18th November, and proceeded to join Division Nine, with the Grand Fleet.

Battleships at Berehaven.

During the summer of 1918, the German Navy was severely criticised by the German Press and taunted by the Allied Press. It had

become evident that enemy submarines unassisted were powerless to prevent the transport of large numbers of troops and a great amount of material.

It was learned from Intelligence sources that for these reasons, if no other, the enemy contemplated an effort to send out battle cruisers to attack convoys, particularly troop convoys.

In anticipation of such possible action by the enemy, and to further strengthen the protection of our convoys, the United States battleships as listed above were based on Berehaven. They were kept in readiness to put to sea on 4 hours' notice.

The enemy raiders never appeared. This Division made 2 trips into the Channel, escorting convoys, when enemy submarines were reported in the vicinity.

REPAIRS AND MATERIAL STATISTICS.

All forces and vessels were made self-sustaining except in respect to periodic docking. There were 377 naval vessels actually in European Waters when the armistice was signed and plans were underway for coping with a possible total of 900 vessels by the close of 1919.

To attain this end, 11 Repair Ships and Tenders were assigned to 9 bases, and additional ones were being fitted out in the United States. The acute shortage of Merchant tonnage did not permit of a sufficiently large number of Repair Ships to take care of the Naval Forces contemplated for the future, so the complements of the existing ships and their shop capacities were increased. Barracks were established on shore and at the cessation of hostilities the 4 ships at Brest and Queenstown were working three 8-hour shifts per day. This scheme was to be applied to all other vessels and additional shop space was to be procured by means of portable shops ashore, which were actually under construction.

That it was possible to make our Forces self-sustaining was due in great part to the efficiency of the operating personnel as well as to the devotion to duty of the Repair personnel of the various ships and bases, who not only maintained the material in the highest state of efficiency but also kept our Forces continuously fitted with all the devices of modern naval warfare as these innovations came into use.

With respect to material and supplies, from the beginning it was apparent that unless a rigid policy of decentralization were adopted, the contemplated development of the operations in European Waters would make necessary the establishment and maintenance of a central organization for material and supplies approaching in personnel and scope of activities that of the Bureau of Supplies and Accounts itself, and as it was obvious also that to obtain the highest military efficiency the several bases and operating groups should be

so far as pertained to the question of supply as independent and as self-supporting as possible, this principle of decentralization was adopted and consistently adhered to.

To obtain the supplies and material found necessary for the large forces involved, which at the date the armistice was signed represented a total of 377 vessels, 15 shore stations (exclusive of aviation) and approximately 80,000 officers and men, two sources of supply were open to us—i. e., the United States and Europe. Obviously, in time of war, every element bearing on the situation as a whole must be given its full weight, and a decision as to the action to be taken in any given case can be reached only after consideration has been given to such important questions as tonnage, time in which delivery can be obtained, total available stocks, whether required for other and more important military purposes, whether the consent of a foreign government to the sale can be secured, whether suitable priority can be obtained by the manufacturer, etc., etc., all aside from the important question of relative price, which latter element, however, necessarily cannot be the weighty factor that peace conditions would demand.

Whenever possible, in procuring material from the British Admiralty, Royal Air Force, or the War Office, or in making purchases from private firms, the existing machinery of the British Government was utilized for the purpose, and every effort made to avoid setting up a parallel system of purchase and supply, when the use of an existing one was possible. In fact, whenever possible, the Allied Governments were looked to as a source of supply, in preference to direct dealings with private firms, as it is reasonable to suppose that the methods of purchase and inspection adopted by these governments are those found best adapted to meet the needs of the military situation, and for the United States Government to enter the field in competition with the Allied Governments would have been uneconomical of money and resources, and unwise and unsatisfactory from every point of view.

COMMUNICATIONS.

Lines of radio and telegraph communication originally established between the Force Commander and the Navy Department, Washington, were extended to include direct wires to main lines of communication throughout Europe.

In co-operation with the Signal Division of the Admiralty, issue and supervision of the use of all codes, cyphers, and radio procedure was maintained in Europe for all U. S. men-of-war and merchantmen.

A wireless receiving station was established at Headquarters, London, for messages from the United States, Germany and Italy.

Up to the signing of the Armistice this receiving station handled approximately 80,000 messages, averaging 500 messages daily, or 51,000 words.

The Force was represented at the Inter-Allied Signal Conference and the Inter-Allied Radio Commission for the purpose of administering communication among the Allied Forces.

Radio Repair Bases were established at convenient shipping points throughout Europe, where repairs to radio installation on Naval and merchant vessels could be undertaken.

At the time of the Armistice the Communications section of Admiral Sims' Staff included a total of 81 officers and 275 skilled enlisted men, such as telegraphists, etc. A very fair idea of the general work of Admiral Sims' headquarters in London is afforded by the work of this Communications Section, which at the time of the Armistice was handling an average of over 500 dispatches a day, consisting of a total of about 27,000 five letter code groups or words. It must be remembered that these messages included communications between the Headquarters and Washington and also with all ships and stations of the command in European Waters. It must also be remembered that these figures cover only those communications by telegraph or cable.

In addition over 500 written communications were handled a day.

OPERATIONS—METHOD OF CONTROL OF SHIPPING IN SUBMARINE ZONE.

From the beginning of the war it became necessary to control shipping. As Allied vessels were proceeding generally without lights it was necessary to regulate traffic so as to avoid collisions, not only between east and west bound traffic, but where this traffic crossed the north and south traffic. Furthermore, it was desirable to know the position of all Allied shipping at sea so as to divert it as necessary away from enemy vessels. War warnings were regularly issued by wireless, warning ships away from enemy raiders or submarines, and particularly warning them away from mined waters. All of this information had to be sent in cypher to prevent its being intercepted by the enemy.

It was evident in the beginning that single control of all shipping must be exercised in order to prevent confusion, avoid collisions, prevent interference in war warnings, divert vessels to safe harbors, and so forth. As the British Admiralty had the largest organization and the greatest interest in shipping, and as the communication service to London is the best in Europe, and further, as the Admiralty Intelligence Service was a highly developed one, the British Admiralty became the center for the control of all shipping. In order that the wishes of the other Allied countries might be put into effect, these

countries maintained naval organizations at London for the purpose of unifying the action of the Allies.

In order to have a rigid control over the sailing of ships, and particularly in order to permit ships to be routed to the best advantage, the Admiralty stationed naval officers in all the principal ports in the Atlantic and Mediterranean to advise ships as to routes and to furnish them the latest information. In a few ports where French interests were paramount French officers were stationed for the same purpose.

When the Germans began the submarine campaign against Allied shipping, it became necessary to prescribe in greater detail the route that each ship should take in approaching European ports. This information was all promulgated by the Admiralty to the various organizations in the principal ports of the world, and communicated by these organizations to all Allied ships before sailing. The principle of unity of control was maintained from the beginning, and the control was centered in London.

When America entered the war the system described was in full operation and had grown to large proportions. A great deal of secret printed instructions had been promulgated by the Admiralty on behalf of the Allies and distributed to Allied shipping. When America entered it was highly desirable from every point of view that she should take advantage of the system already organized and in operation for controlling shipping. This was effected by making headquarters of the Commander, United States Naval Forces, in London, where he could be in intimate touch with the Admiralty organization.

In the foregoing system all Allied shipping was handled in one way and through one procedure, so that vessels sailing from South America or Africa, New York or France, were all handled in precisely the same manner and with similar sets of instructions, which greatly simplified the procedure for the masters of merchant vessels. Instructions were given in English and French.

After the opening of unrestricted submarine warfare it soon became evident that the method in use of protecting the shipping by patrolling dangerous areas and letting ships proceed independently was not satisfactory, and the losses—particularly during April, 1917—became so serious as to necessitate a change in methods.

As a substitute for the system of independent sailings through patrolled areas, the convoy system was adopted and put into effect in the summer of 1917. The same reasons for strong central control of all shipping obtained more in the case of convoys than in the case of vessels sailing independently, for as all vessels were sailing without lights and as convoys frequently consisted of upwards of forty vessels, the serious consequences of a collision caused by

one convoy meeting another by night or in a fog were at once evident. In order to eliminate the danger of collisions, as well as to give convoys safe routes, each Atlantic convoy was routed from London and the route cabled by cypher to the port from which the convoy sailed. Furthermore, as the destroyer escorts were all based in Europe, the schedule of convoy sailings was necessarily determined in London, and the sailing dates from various ports were regulated so as to make a co-ordinated system in which the most efficient use was made of available destroyers, and congestion of ports avoided by separating dates of arrivals of convoys.

The question of organizing convoys, providing them with signal manuals and instructions as to how to change course while in formation, how to proceed in a fog, and all details of handling convoys were worked out and promulgated by the Admiralty on behalf of the Allies. The U. S. Navy furnished Commodores for troop convoys composed of American transports, also for one cargo convoy with Army stores. All other convoys were commanded by Commodores from the British Navy.

By means of secret codes orders could be sent to the Commodore and convoys diverted from their routes as necessary in order to avoid enemy submarines or other convoys. This control from London applied to all convoys in the Atlantic, whether bound for France or the United Kingdom, and the routing of all troop and cargo convoys, including U. S. Troop convoys, as well as the schedule for sailing of these convoys, was determined in London and co-ordinated so as to prevent interference.

The advantages of the foregoing system are manifest. All confusion and difficulty were avoided. The most efficient use was made of different port facilities. A rigid control was maintained at all time over all Allied shipping. Masters of ships found one set of instructions regardless of where their ships traded, and finally accumulated experience of the Allied mercantile marines was available in London for dissemination to all the Allies. Invaluable aid to shipping was given by the Admiralty Intelligence Division, which saved thousands of tons of Allied shipping by timely warning to the convoy section of the position of the enemy.

The foregoing remarks apply only to the control of shipping at sea—that is, principally to the safety of shipping. As the submarine war progressed it became evident to all the Allies that the success of the Allied campaign was entirely dependent on shipping. To effect greater economy in the use of shipping, and particularly to make efficient war use of all available Allied shipping, there was set up the Allied Maritime Transport Council, whose function was to recommend the best allocation of available Allied shipping, regardless of

the nationality of the shipping. The plan was to pool the combined shipping of the Allies and to use all of this shipping in the most efficient manner possible to carry out the plans of the Allied campaign. Under this organization, British shipping was allocated to France and Italy and British vessels not only carried American troops to Europe in large numbers, but when the ship-building program fell behind the flow of troops to France British vessels were allocated to carry supplies from America to France for the U. S. Army.

U. S. NAVAL AVIATION.

The first Aeronautic Detachment of the U. S. Navy landed in Bordeaux, France, on June 5, 1917 under the command of Lieutenant Whiting, U. S. N. Arrangements were made with the French to place the officers and men in French Training Schools.

U. S. Aviation Headquarters was established in Paris on October 1, 1917, with Captain Hutch I. Cone in command under Admiral Sims.

On September 16, 1917, the Navy Department authorized the establishment of 15 Naval Air Stations abroad. Sites for 9 in France and 4 in Ireland were already chosen as follows:

FRANCE.	IRELAND.
Dunkerque.	Lough Foyle.
L'Aber Vrach.	Wexford.
Brest.	Queenstown.
Ile Tudy.	Whiddy Island.
Le Croisic.	
Paimboeuf.	
Fromentine.	
Rochefort.	
St. Trojan.	

At this time the United States was unable to provide satisfactory seaplanes, so a Technical Section was organized to advise the Navy Department in regard to the most successful types of seaplanes and to keep them informed of all improvements.

In October, 1917, an arrangement was made with the British Admiralty which later became known as the Killingholme project. This project was an agreement by which England should furnish 50 flying boats and 50 lighters, and the United States 40 flying boats and 30 lighters by March 1918, for work of an offensive nature in Heligoland Bight. This station was at first operated in conjunction with the British, and then taken over completely on June 30, 1918 by United States Authorities. It soon became apparent that ex-

tended long distance bombing raids could not be undertaken for a long time, because the American machines first received were entirely unreliable. Therefore, for some time the actual operations were carried on with British machines.

The original plan was to tow the planes on lighters to some point about 50 miles from the objective, launch the planes there, and tow the lighters back to their base. The planes were to carry out the attack and then make their way back to the base. Before an attack of this kind could be made it was necessary that the machines be proved capable of carrying out regular flights of 6 to 7 hours. Unfortunately, owing to faulty construction, the machines could not be trusted to carry out the work intended, and in spite of repeated efforts these machines were not in first class condition until the middle of October 1918. Plans were made to carry out experiments with lighters during October but unfortunately the weather was entirely unfavorable. The signing of the armistice subsequently ended operations.

Although the original purpose of this station was never realized, much valuable anti-submarine patrol work was done; also several hazardous night patrols were made to ward off attacks of enemy Zeppelins. From February 19, 1918, until the United States Forces took command of this station, 321 patrols were made, of which 171 were by American personnel. Since the station was taken over up to the Armistice 233 war patrols were made with an average length of 4 hours.

THE AVIATION PROGRAM ON JANUARY 1, 1918.

Station	No. of machines	No. of officers	No. of men.
England, Killingholme	40 H-16	70	736
Ireland:			
Lough Foyle	18 H-16	46	394
Wexford	18 H-16	46	394
Queenstown	24 H-16	58	498
Whiddy Island	24 H-16	58	498
France:			
Dunkerque	32 (Spec.)	40	449
L'Aber Vrach	24 H. S-1	34	390
Brest	24 H-16	58	498
Brest (K. B.)	6	2	120
Ile Tudy	24 H. S.-1	34	390
Le Croisic	24 H. S.-1	34	390
Paimboeuf	4	16	237
Fromentine	24 H-16	58	498
Rochefort		16	237
St. Trojan	24 H. S.-1	34	290
Moutchic [1]		12	298
Pauillac [2]			
Totals	310	616	6317

[1] School. [2] Assembly and repair.

By January 1, 1918, three stations and the school (Moutchic) were operating, with a personnel of over 100 officers and 1,000 men.

In February, 1918, Commander F. McCrary, U. S. N., was placed in command of all Air Stations in Ireland, with headquarters at Queenstown.

In response to a request of the Italian Government an American detachment was sent to Lake Bolsena and sites were selected for stations at Porto Corsini and Pescara. Lieutenant J. I. Callan, U. S. N. R. F., with Headquarters at Rome, was placed in command of U. S. Naval Aviation Forces in Italy.

July 1st was the date set on which all seaplanes in France should start operations. On this date the following stations were operating:

Dunkerque.	Le Croisic.
Ile Tudy.	Paimboeuf (dir.).
Moutchic (school).	Bolsena (school).

The following stations were completed awaiting machines:—

Trequier.	L'Aber Vrach.
Brest.	Fromentine.
St. Trojan.	

Probably one of the most important operations undertaken by the United States Naval Aviation was the Northern Bombing Project, which, due to its great possibilities as an offensive weapon, was given priority over all other Naval Aviation activities. The policy was to establish night and day bombing squadrons in the Calais-Dunkirk Area for the purpose of continuous bombing of enemy submarine bases on the Belgian Coast. These independent squadrons, called the Northern Bombing Group, were to operate under the general orders of Admiral Keyes, R. N., at Dover, and were to work in close co-operation with the British Air Forces already in this area.

The first program called for 12 squadrons, 6 day and 6 night; 4 of the day squadrons to be operated by the Marine Flying Group. This program was reduced to 8 squadrons, as the United States Army could not spare a sufficient number of machines.

Until sufficient machines arrived to form a unit, all day bombing planes that were in commission were loaned to the British. On October 14, 1918, No. 9 Squardon, Day Wing, with 7 machines, carried out the first Northern Bombing Day Raid on the railway siding at Thielt. From the date of the first raid, October 14, 1918, until October 27, when operations were suspended, 8 raids were made by No. 8 and 9 Squadrons, Day Wing, and 15,502 lbs. of bombs dropped on enemy territory.

Since the early part of June 1918, the personnel of the Night Wing Squadrons were attached to the British R. A. F., for training and for actual war service. On August 11, 1918 the first Caproni plane arrived. This machine made one successful night raid on the sub-

marine shelters in Ostend. Two other raids were attempted but were unsuccessful, due to trouble with the planes. After August 15, no war flights were made with these planes. That these planes were wholly unfit for night bombing work could not be foreseen. Negotiations for 10 Handley-Pagè machines were opened, but these had not arrived at the time of the armistice. The night wing dropped only 2,670 lbs. of bombs. However, the United States Naval personnel, bracketed with the British, assisted in dropping 60 tons of bombs on various Naval and Military objectives in Belgium.

Owing principally to delays in the delivery of suitable machines the record of the Northern Bombing Group is one of disappointment; neither the night nor day wings were really operating efficiently at the time of the armistice.

A total of 39 attacks on enemy submarines were carried out by United States Naval Forces in European Waters and 80 tons of bombs dropped on enemy objectives. Of these attacks, 10 can be considered to be to some degree successful, although there is no proof that any submarine has been sunk by aircraft. Two attacks carried out by the Killingholme Station have been classified as "seriously damaged." However, the value of anti-submarine aircraft cannot be judged by successful attacks, as its most valuable work is frequently done in preventing submarines from attacking shipping.

Although the U. S. Naval Aviation activities were stopped by the armistice just when good results were apparent, the record made by the United States is surprisingly good. The small force which was landed in June 1917 had tremendous problems to overcome. In the first place they knew very little about Naval Aviation and the part the United States was to play in the anti-submarine campaign.

They had first to learn the game and then to decide where our effort would be best placed. They then had to choose sites for stations, overcome the difficulties of lack of materials, establish schools for training personnel and in general expand their imaginations to meet the ever-changing military and naval situation. From a project of 4 stations and a school in France U. S. Naval Aviation quickly expanded into 30 bases, including seaplane stations, repair bases, schools and bombing squadrons; and from a personnel of 7 officers and 125 men to 1,500 officers and 15,000 men, backed by thousands of officers and men training in the United States. On the whole the United States Navy may be proud of its aviation service, for in spite of its unassuming records of attacks it performed a wonderful work of construction, and best of all showed a fine spirit of self-sacrifice and determination in the face of often disheartening difficulties.

THE U. S. NAVAL AVIATION SITUATION ON NOV. 11, 1918.

Station	Operations commenced	Aircraft Nov. 11, 1918	Number of flights	Sea miles patrolled	No. of officers	No. of men
French:						
Brest (sp)	Aug. 1, 1918	30 Seaplanes	211	7,355	31	814
Fromentine	Aug. 9, 1918	14 Seaplanes	335	38,009	31	372
Arcachon	Oct. 1, 1918	7 Seaplanes	106	8,727	26	318
L'Aber Vrach	July 23, 1918	19 Seaplanes	355	29,302	41	458
Ile Tudy	March 7, 1917	21 Seaplanes	1,238	104,877	22	363
Le Croisic	Nov. 18, 1917	16 Seaplanes	1,045	113,324	24	337
St. Trojan	July 3, 1918	13 Seaplanes	246	19,533	26	343
Frequier	Sept. 30, 1918	8 Seaplanes	30	1,380	16	266
Dunkerque	March 18, 1918	12 Seaplanes	491	45,630	7	205
Paimboeuf	March 5, 1918	3 Dirigibles	257	48,630	30	477
Guipavas	No operations	1 Dirigible			15	396
Gujan	do	None			10	240
Brest (k. b.)	Test flights only	22 Kite Balloons			18	59
La Trinite	do	4 Kite Balloons			5	150
La Pallice	do	do			9	216
Pauillac (repair base)	Test flights July 2, 1918.	81 Seaplanes	[1] 372	[1] 15,085	133	4,071
Moutchic (school)	Training flights Nov. 11, 1917.	24 Seaplanes	[2] 10,807	[2] 242,320	57	493
Irish:						
Queenstown	Sept. 30, 1918	28 Seaplanes	64	11,568	72	1,426
Lough Foyle	Sept. 3, 1918	7 Seaplanes	41	6,000	20	432
Wexford	Sept. 18, 1918	5 Seaplanes	98	19,135	22	405
Whiddy Island	Sept. 25, 1918	3 Seaplanes	25	3,870	18	400
Castletownbere	May 21, 1918	16 Kite Balloons	[3]		12	91
Italian:						
Porto Corsini	July 25, 1918	17 Seaplanes	745	(?)	27	360
Lake Bolsena	Feb. 20, 1918	8 Seaplanes	5,540	(?)	11	69
English:						
Killingholme	Feb. 19, 1918	46 Seaplanes	404	92,797	91	1,324
Eastleigh	Sept. 24, 1918	41 Seaplanes	[3]		70	1,928
Northern bombing group	July 20, 1918	35 Landplanes	[4]		294	2,154
Total War Flights			5,691	549,078		
Training			16,347	242,320		
Total			22,038	791,398	1,147	18,308

[1] Test. [2] Training. [3] Test flights. [4] No patrol flights.

8 officers and 11 men have been reported as casualties, while 2 officers were taken prisoners of war.

MISCELLANEOUS INTELLIGENCE NOTES OF INTEREST.

1. British transports carried during the war from the United States 53% of all American troops sent to Europe. American transports carried 45% and French transports carried 2%.

(NOTE. A few Italian transports were chartered and managed by British and are classed as British transports, as Great Britain made all arrangements for the employment of these ships and had to give Italy cargo tonnage in their place. A few Dutch liners were requisitioned by United States and are classed as American transports.)

2. During the rush period, that is, from April 1 to October 31, 1918, British transports carried 57% of the American troops and American and French transports carried 43%. During the month of August British transports carried 65% of the American troops.

3. One year after United States entered the war there were fewer than 300,000 American troops in Europe. The marvel of troop transport did not come until the summer of 1918, when the American Army was quickly built up to over 2,000,000.

4. The greatest number of American troops landing in Europe in one month was 318,000, which landed during the month of July, 1918. In addition to this number there were a small number of colonial troops, as well as a few thousand enlisted men of the United States Navy, transported to Europe.

5. The largest convoy of troops carried 36,000 in 15 ships.

6. During the summer of 1918 there were at times upwards of 150,000 troops on the water between United States and Europe.

7. Approximately 200 German submarines were put out of action during the war. Nearly half of these were sunk in the North Sea. The most effective measures against submarines are given in the order of importance:—

a. Depth charges.
b. Mines.
c. Torpedoes fired by our own submarines.
d. Mystery ships.
e. Gunfire of patrol craft.

8. Of the submarines sunk, 90% were sunk by Great Britain, 5% were sunk by the United States and 5% by France and Italy.

9. The Northern Barrage accounted for 6 submarines.

10. In only one case is listening gear believed responsible for the destruction of a submarine. Listening gear, however, had a considerable moral effect on the enemy and greatly interfered with his operations in patrolled areas.

11. The average number of submarines operating at any one time was not great. The average number each month for the months of June, July and August, 1918 was about 33, of which 23 were in the Atlantic around the United Kingdom and France; eight were in the Mediterranean, and one or two on the American Coast.

12. The average stay at sea of a submarine was about 27 days for *U* boats, and 20 days or less for the smaller *UB* boats, during which it would sink from 6,000 to 10,000 tons of shipping. Approximately two-thirds of this time was spent on passage to and from his area of operations, except for those submarines operating in the North Sea. The cruiser submarines remained at sea 3–4 months.

13. The total Allied naval losses during the war were about 400 vessels of various types. The total enemy losses were about 500 vessels. The greater part of the enemy losses were in submarines. While the Allies lost a larger number of battleships and heavy cruisers, the enemy losses were greater in light cruisers, torpedo boats, minelayers, armed merchant cruisers and gunboats.

14. Beginning with a small force of destroyers, the United States naval forces in Europe were gradually increased until American destroyers were escorting approximately 27% of the shipping in the

Atlantic. The British ships were escorting 70% and French vessels 3%.

15. An inspection of the charts showing sinkings by enemy submarines in April 1917 and April 1918 shows that the convoy system established during the summer of 1917 not only greatly decreased the losses but forced the submarines into narrow waters in order to enable them to find shipping.

16. In April 1917 vessels were being sunk 600 miles west of the English Channel, whereas in the corresponding month of the following year all sinkings were in the near vicinity of land. This change was primarily due to the fact that it was difficult for submarines to find convoys at sea, and they were forced to do their hunting in the approaches to narrow waters, where their chances of finding shipping were greatly improved. There was a further reason for submarines operating close in shore. Practically all shipping at sea was in convoys, but vessels proceeding from one port to another along the coast usually sailed independently through patrolled waters. As many submarine captains did not relish the idea of attacking convoys, these submarines found easier opportunities in attacking shipping proceeding along the coast.

17. The coastal trade was so great that the number of escorting vessels available was wholly inadequate, and most ships coasting had to proceed through lightly patrolled waters. All the coal trade from Cardiff to France passed along the Cornish coast independently as far as Falmouth, where it was assembled in convoys to cross to France. A considerable part of the total losses of shipping occurred along the coasts.

18. The principal advantages of the convoy system were:—

(*a*) It furnished a large measure of protection to ships at sea by making it difficult for the submarine to find shipping. And when convoys were sighted successful attack by submarines was made difficult.

(*b*) It reduced the losses of shipping to about one-tenth of the losses of independent sailings.

(*c*) As submarines were unable to find convoys at sea they were forced to operate in narrow waters, where our anti-submarine craft, aircraft and so forth were most effective, and enabled these craft to sink a large number of German submarines.

(*d*) It protected shipping against the gunfire of surface raiders and particularly of submarine cruisers, as each convoy was escorted by one or more men-of-war.

(*e*) The protection of men-of-war gave a great sense of security and of confidence to the mercantile marine. Furthermore, as the men-of-war escorting convoys had excellent wireless equipment and

were familiar with rules for handling secret publications, instructions of a very secret nature could be sent from London direct to the convoys through the cruiser escort and routes of convoys could be readily changed to avoid submarine activity farther along the route. The cruisers had rigid control over the convoys and prevented the showing of lights, use of wireless, throwing overboard of garbage, and so forth.

(*f*) Any reports desired from convoys could be readily received from the cruiser direct.

WHY GERMAN SUBMARINES FAILED TO SINK LOADED TROOP TRANSPORTS.

The public is much interested in the reasons why German submarines failed to interrupt the flow of troops from the United States to Europe. We cannot assume that the Germans were averse to attacking transports, as the sinking of the *Tuscania* and the *Moldavia*, as well as the torpedoing of the *Persic*, all three troop transports in different convoys, make it unlikely that the Germans purposely refrained from attacking transports. At least three other troop convoys were ineffectually attacked by submarines as well. The official German announcement and German press commented gloatingly when they thought they had sunk the *Leviathan*, though they discovered later that it was the *Justicia*. There is no possibility of mistaking transports for cargo vessels, as the two types are quite distinct. Transports in general have two or more smokestacks, and their superstructure decks and higher speed make it easy to distinguish them from cargo vessels. The main reasons why submarines were unable to hinder the flow of troops are as follows:—

(a) Speed of Transports.

In general no vessels that were unable to maintain a speed of at least 12 knots were permitted to carry troops, and many of the transports had speeds of 15 knots up to 22 knots. It must be understood that high speed in itself does not render ships immune from attack. High speed, however, makes it much more difficult for a submarine to get in a favorable position to deliver an attack. Unless a submarine is almost in the course of a fast ship he will have little chance of getting in position for attack, as the submerged speed of submarines is only 7 to 8 knots. Furthermore, in order to hit a high speed vessel the tropedo must be fired farther ahead than in the case of a slow vessel, and as the torpedo reveals itself by its wake there is more opportunity for a fast ship to maneuver clear of the attack than obtains in the case of slow vessels. A considerable degree of immunity, therefore, was ensured by selecting vessels of good speed to serve as transports.

(b) Destroyer Protection.

In general, transports were assigned a destroyer escort, which was about *three* times as strong as the escort assigned to cargo vessels. In some cases of particularly valuable transports the escort was ten times as strong as the escort assigned to cargo vessels.

(c) Darkness.

During darkness the periscope of the submarine is useless and submarines must come to the surface if they desire to deliver attack. While on the surface submarines become subject to attack by destroyers surrounding the convoy. During the ordinary dark night visibility does not exceed half-a-mile to a mile, and as the convoy is completely darkened the probability of a submarine finding a convoy at night is extremely remote, and there is considerable risk to the submarine if he decides to attack. For the foregoing reasons troop convoys in general, while in the open sea, were brought through the most dangerous submarine areas during darkness.

(d) Routing of Transports.

As only about 15% of the vessels in Atlantic convoys carried troops, it became desirable, so far as practicable, to route troop transports in special lanes through which cargo convoys did not pass. This greatly increased the safety of troop transports, as it practically forced submarines to concentrate their efforts in the areas through which cargo vessels (comprising 85% of the shipping) passed.

If a German submarine took station in a troop transport lane he might have remained for weeks without sighting a troop convoy. This failure to find shipping in troop lanes forced the submarine into the cargo lanes and so gave a large measure of protection to troop convoys. If the submarines had known the positions of these troop lanes and had concentrated on them, they would have found a relatively small number of ships, all of high speed, hence difficult to attack. Furthermore, they would have encountered a destroyer escort three times as strong as the escort protecting cargo vessels.

Having taken the foregoing steps for the protection of troops, it was practically certain that submarines would be forced to confine their attacks almost exclusively to cargo vessels, and this was borne out by the experience of the war.

In the summer of 1918, when the transport of troops reached such large proportions, it became evident to the Germans that this uninterrupted flow of troops would shortly reverse the military situation and there were constant clamorings in the German press against the German Admiralty for the failure of the submarines to stop this flow of troops. Repeated public statements in America, as well as in Europe, by Allied statesmen called world attention to the tremendous transport of troops and the inability of German submarines

to sink transports. This also aroused public opinion in Germany and brought pressure to bear on German Naval authorities to make some demonstration to prove the contrary—whether such action was justified on sound military grounds or not. It led directly to the fall in August 1918 of the Secretary of the Navy, Von Capelle. The new Secretary of the Navy, Admiral von Mann, presumably catering to public opinion, made a determined effort against troop transports en route to France. This was evidenced by concentration of submarines in new cruising areas, but no success was attained against transports, while there was a considerable falling off in sinkings of cargo vessels, as shown by the following figures:—

	Gross tons.
Sinkings during July	260,000
Sinkings during August	271,000
Sinkings during September	180,000
Sinkings during October	112,000

REVIEW OF THE GERMAN SUBMARINE SITUATION AT THE END OF THE WAR.

1. Number of submarines available at beginning of the war	28
Average number of Submarines available during summer 1917	152
Number of Submarines available at end of war	168
Number of Submarines built during the war	340
Number of Submarines building and fitting out at the end of the war	70
Number of Submarines lost during the war	200

2. German submarines on hand or available at end of the war according to types:

U-type	73
UB-type	60
UC-type	35
Total	168

3. German submarines building and fitting out at end of the war, according to types:

U-type	29
UB-type	15
UC-type	26
Total	70

4. Summary of all German submarines at end of war:

Losses	203
Surrendered at Harwich	138
Inspected in Germany	23
Building and fitting out	70
Miscellaneous	8
Total	442

5. Summary of all Austrian Submarines at end of war.

Total built	35
Obsolete Units	10
Losses	7
Total Available	18

6. German Submarine situation in January, 1917, as revealed by the statement of Captain Persius in the "Berliner Tageblatt," published November 18, 1918:

Average number submarines operating during January 1917	16, or 12%
Average number under repair during January 1917	28, or 20%
Average number resting during January 1917	41, or 30%
Average number training during January 1917	53, or 38%

AVIATION.

U. S. NAVAL AVIATION OPERATIONS ON COAST OF FRANCE.

Source: Director of Naval Aviation.

20 April 1919.

Attention is invited to the fact that the French had thirteen coastal aeroplane stations: Guernsey, Treguier, La Penze, Camaret, Lorient, Quiberon, Le Croisic, Ile d'yeu, Les Sables d'Olonne, La Pallice, Le Verdon, Hourtain, and Bayonne, and dirigible stations at Guipavas and Rochefort, each operating for a year or more, covering the same areas as the United States Seaplane Stations at Treguier, L'Aber Vrach, Brest, Ile Tudy, Le Croisic, Fromentine, St. Trojan and Arcachon, and a dirigible station at Paimboeuf.

The first American patrol of the French Coastal Unit was made at Le Croisic on November 13, 1917, and the last at Brest on December 13, 1918, when, despite bad weather, the Presidential Convoy was met and escorted by American planes and dirigibles.

Treguier and Arcachon did not begin operations until shortly before the armistice was signed, and the effective period of operations of the other stations did not average six months; but from April to November 1918, according to French reports, members of the six active United States Naval Air Stations sighted 27 submarines, attacked 25, damaged 12, and probably sank 4, while the fourteen French Air Stations in eighteen months sighted 43 submarines, attacked 40, damaged 13, and probably sank 5. In addition each force discovered and destroyed a large number of drifting mines.

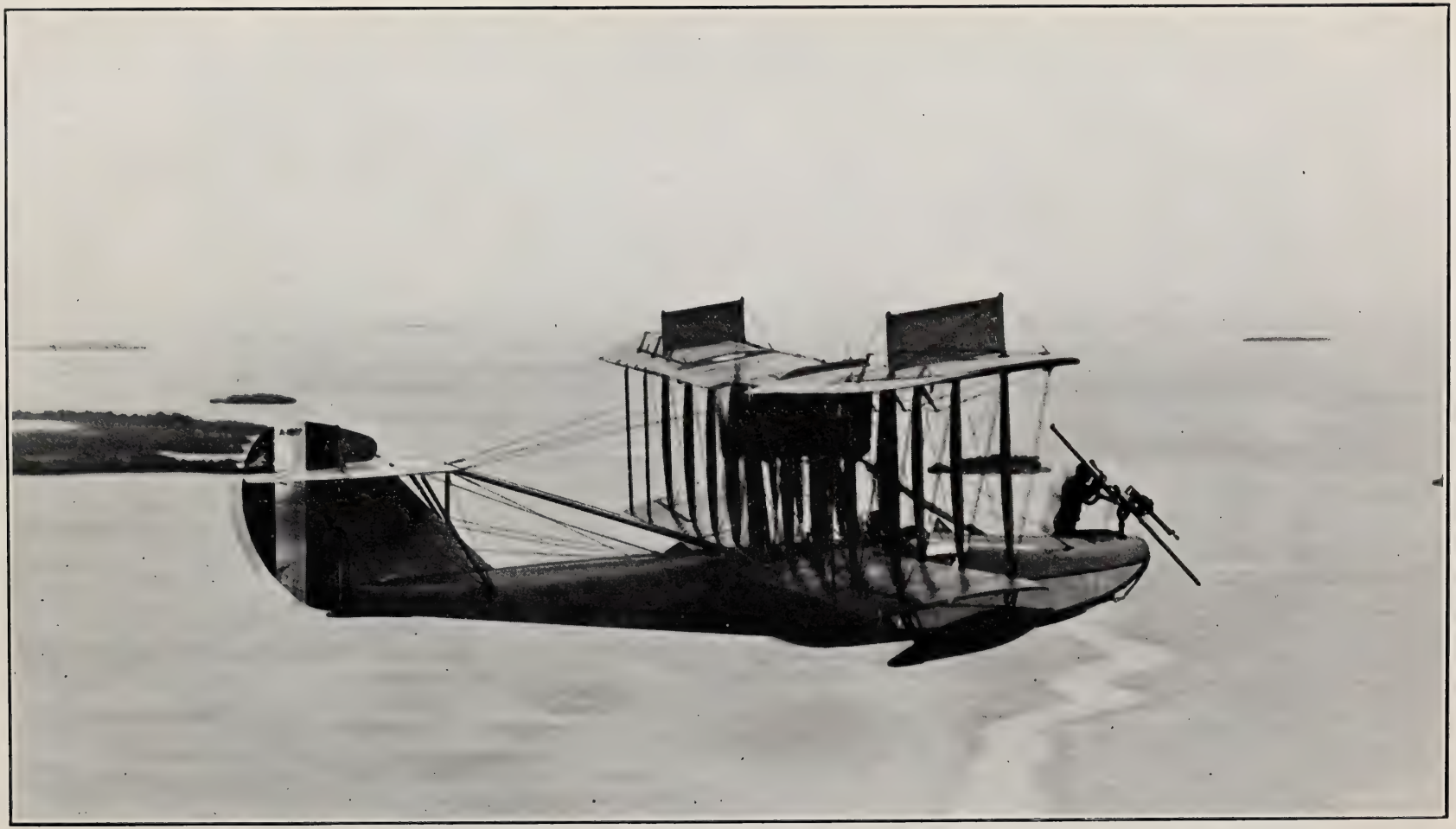
The French figures given above and those which follow are quoted merely to show comparison of performances of the French and United States Naval Air Stations as judged from one standard.

The majority of the French Air Stations were equipped with land planes that could fly only in fine weather and near shore, which handicapped them especially in convoy operations; but the United States seaplanes being seaworthy could venture further, and afforded protection to convoys in an increasing degree as their patrols became systematized.

In every case when a submarine was reported in the patrol area of a United States Naval Air Station during hours and weather fit for flying an alert section was sent in search. Scout patrols were maintained whenever circumstances justified them and these harassed the submarines even more than the alert patrols, which could seldom reach the "fix" of the "allo" in time because of its distance from the station.



ASSEMBLING HANGARS AT NAVAL AIR STATION, BREST.



H-BOAT, EQUIPPED WITH MACHINE GUN, IN AIR.

It is to be remembered that this report is confined to our stations of the so-called "French Group," and does not include our Northern Bombing Group activities.

Summary of U. S. Naval Aviation Operations on the Channel-Atlantic Coast of France. 1917–1918.

[(Z. A. B.)—Zone Aerienne de Bretahne. (Z. A. L.)—Zone Aerienne de la Loire. (Z. A. G.)—Zone Aerienne de Gascogen. (Z. A. N.)—Zone Aerienne de Normandie.]

Anti-Submarine	French Figs.	U. S. Figs.	*Convoy Escort*	
ILE TUDY (Z. A. L.) (In operation nine months):				
Submarines sighted	18	6	Convoys reported in 9 mos	490
Submarines attacked	18	6	Convoys sighted in 9 mos	297
Submarines damaged (2 severely damaged, 2 destroyed)	7	3 (2)	Convoys escorted in 9 mos. through station area	280
			Days fit for flying	157
ST. TROJAN (Z. A. G.) (In operation five months):				
Submarines sighted	3	2	Convoys reported in 4 mos	163
Submarines attacked	2	2	Convoys sighted in 4 mos	57
Submarines damaged (1 possibly destroyed.)	2	0	Convoys escorted in 4 mos. through station area	27
			Days fit for flying	72
LE CROISIC (Z. A. L.) (In operation 13 mos.):				
Submarines and mines sighted	2	(1)	Convoys reported in 9 mos	508
Mines destroyed	1	(1)	Convoys sighted in 9 mos	138
			Convoys escorted as above	95
			Days fit for flying	166
FROMENTINE (Z. A. L.) (In operation four months):				
Submarines sighted	1	(1)	Convoys reported in 4 mos	153
Submarines attacked	1	(1)	Convoys sighted in 4 mos	67
Submarines badly damaged	1	(1)	Convoys escorted as above	43
			Days fit for flying	70
L'ABER VRACH (Z. A. B.) (In operation three months):				
No submarines sighted but mines sighted and reported	2	2	Convoys reported in 3 mos	64
			Convoys sighted in 3 mos	36
			Convoys escorted as above	32
			Days fit for flying	48
PAIMBOEUF (Z. A. L.) (In U. S. operation 8 months):				
Submarines sighted	5	1	No data as above available but report received of patrols with convoys *under way* for slightly more time and mileage than best destroyer or gunboat in escort.	
Submarines attacked	3	0		
Submarines damaged (One defended itself gun.)	2	0		

[1] No report.

The other stations began operations so late that they made no reports.

According to United States Reports, for an effective period of six months the six active United States Naval Seaplane stations sighted 9 submarines, attacked 8, damaged 3, and probably sank 2.

The French in eighteen months with twelve plane and two dirigible stations sighted 43 submarines, attacked 40, damaged 13, and probably sank 5, within the same territory as our stations covered—the figures are taken from their official bulletins and archives for anti-submarine activity and from our official Aviation Intelligence Reports in regard to convoys. No convoy under our aerial escort was successfully attacked by hostile submarines. The same is true of French Aviation.

The difference between the French and U. S. figures regarding anti-submarine operations is due partly to the very strict standard on claims adopted by the U. S. Naval Aviation forces and partly to the more complete sources of information available to the editors of the French records.

The bulletins *de la Guerre Sous-Marin* were published by the Anti-submarine Section of the French Ministry of Marine. The extracts from the French Air District Archives were supplied in compliance with a request from the United States Naval Aviation Headquarters. These tables were compiled by listing and checking reports of aerial activity as therein reported.

The Anti-Submarine Section of the French Ministry of Marine compiles its bulletins *de la Guerre Sous-Marin* from all possible sources of information—reports via the District *Bureaux de Renseignement* from Air Stations, coast guard, semaphore stations, convoy forces, patrol forces, mine laying and sweeping forces, and from Allied Navy Departments, and its Military, Naval and Diplomatic Intelligence Services.

The Air District Archives are compiled from all the above local sources of information via the District *Bureaux de Rensiegnement* and checked by information from the Ministry.

The United States Naval Air Station figures are based mainly on reports from the pilots, which their commanding Officer treated very strictly unless verified by the French, and such confirmatory information was not always received.

ANTI-SUBMARINE OPERATIONS ON CHANNEL-ATLANTIC COAST OF FRANCE.

Ile Tudy (Data from Station Reports).

April 23, 1918. Ensign K. R. Smith, U. S. N. R. F., Observer G. E. Williams, C. E., U. S. N., about 11h 30m six miles NW. Penmarch,

sighted a suspicious wake, dropped two bombs, first of which landed on the fore part of the disturbance and the second ten feet ahead. Destroyer *Stewart* headed for spot and dropped three depth charges. On the 6th of May spot of oil could still be seen. Ensign Smith and Observer Williams were officially credited by the French Naval authorities with the submarine, cited to the order of the day and both awarded the Croix de Guerre.

July 5, 1918. Two planes 2 miles SW. Point L'Ervily dropped three bombs. Small amount of oil seen.

August 27, 1918. Two miles SE. Penmarch 2 bombs dropped. Some oil.

August 10, 1918. Two miles NW. Penmarch dropped 1 bomb on bubbles.

September 27, 1918. Four miles S. Penmarch two bombs dropped on what appeared to be mine. Seaplane shaken by great concussion.

October 22, 1918. At 11h, mine bomber exploded by Ensign E. S. Pou, U. S. N. R. F., and Observer H. F. Duffy, C. M. M. (A.), U. S. N., 14h 3m, three bombs dropped on oil streak. A submarine had been heard up to that time by means of listening devices on a French boat and after this the submarine was heard no more. The Commandant of the French patrol boat *Leger* asserts the submarine was hit and probably destroyed.

October 26, 1918. Ensign W. G. Sprague, U. S. N. R. F., and Observer W. A. Ropke, M. M. 1c (A) U. S. N., sighted an oil wake 4 miles SW. Penmarch, dropped two bombs. Later advice from French indicated that the submarine was sunk.

SUMMARY.

April 23–October 26, 1918.

Station Reports		*French Archives.*	
		(In operation nine months)	
Submarines credited destroyed	2	Allos and SOS calls rec'd	66
Mines destroyed	2	Alert flights in response	42
Submarines damaged	1	Submarines sighted	18
Attacks on suspicous objects	3	Submarines attacked	18
		Submarines damaged	7
		(2 severely damaged, 2 destroyed)	

St. Trojan (Data from Station Reports).

September 6, 1918. Twenty miles W. St. Trojan submarine attacked without success.

October 26, 1918. Four bombs dropped on suspicious wake; submarine sighted immediately afterward by French seaplanes.

SUMMARY.

September 6–October 26, 1918.

Station Reports		*French Archives.*	
Attacks, unsuccessful	2	(In operation five months.)	
		Allos and SOS calls rec'd	57
		Alert flights in response	
		Submarines sighted	3
		Submarines attacked	3
		Submarines damaged (possibly destroyed)	2

Le Croisic (Data from Station Reports).

December 8, 1917. Ensign K. R. Smith, pilot, Frank Brady, Q. M. 3c, observer. Sighted submarine Northeast of Belle Isle. Circled around and approached close. It was recognized as a French submarine.

April 27, 1918. Thomas Weddell, Lds. Q. M. pilot, R. S. Waugh, Q. M. 2c. observer. Sighted oil spot. Dropped two bombs—both exploded.

May 8, 1918. Ensign P. E. Gillespie, pilot, Gunner M. E. Rothenberg, observer. Sighted oil spot. Dropped two bombs—both exploded.

May 30, 1918. Ensign S. S. Walker, pilot, R. S. Waugh, Q. M. 2c. observer. Sighted dark object looked like mine. Dropped two bombs. One exploded.

June 1, 1918. Thomas Weddell, Lds, Q. M. pilot, Gunner M. E. Rothenberg, observer. Sighted a drifting boat which they suspected might cover mines. Dropped a phosphorous buoy to destroyers who investigated, after which one bomb was dropped. Nothing occurred.

October 22, 1918. Ensign Robert T. Whitehouse, Pilot, N. Barrett, Q. M. 1c. observer. Sighted a commotion Northeast of Belle Isle. Approached and circled. Dropped two bombs, one exploded. Commotion was caused by exploding long range shells from French shore batteries.

SUMMARY.

December 8–October 22, 1918.

Station Reports.	*French Archives.*	
No engagements	(In operation twelve months.)	
	Allo and S O S calls rec'd	28
	Alert flights in response	24
	Subs and mines sighted	2
	Mines destroyed	1

Fromentine (Data from Station Reports):

October 2, 1918. Fifteen miles S. of Ile d'Yeu 8h 15m, bombs dropped on two spars.

October 13, 1918. Twenty-two miles SW. Sables D'Oloones. Three bombs dropped on oil streak; later ascertained to be sunken wreck.

October 27, 1918. Three miles NE. Ile d'Yeu, machine gun emptied on what was discovered to be a barrel.

SUMMARY.

Station Reports.	*French Archives.* (In operation four months.)	
No engagements.	Allo and SOS calls rec'd	13
	Alert flights in response	8
	Submarines sighted	1
	Submarines attacked (possibly destroyed)	1

Paimbeouf (Data from Station Reports).

October 1, 1918. Ten miles S. Le Four 18m Greenwich, sighted suspicious object to northward at about mile distant; object made out to be enemy submarine, which immediately opened fire. First shot good line shot, but short; shrapnel used. Ship turned and headed for convoy. Thirteen other bursts near the ship. Apparently no damage done. Dirigible rejoined convoy.

SUMMARY.

Station Reports.	*French Archives.* (In operation eight months.)	
Submarine fired at dirigible.	Submarines sighted	5
	Submarines attacked	3
	Submarines damaged	2
	(One defended itself by gunfire.)	

L'Aber Vrach.

SUMMARY.

Station Reports.	*French Archives.* (In operation three months.)	
One mine subjected to gun fire.	Allos and SOS calls rec'd	1
	Allo flights in response	1
	Mines sighted and reported	2

EXTRACT FROM A LETTER OF THE COMMANDANT DES PATROUILLES AERIENNES DE LA LOIRE.

1. EXTRACTS FROM CONFIDENTIAL ADDITION TO THE BULLETINS OF THE SUBMARINE WAR (REGARDING AVIATION ACTIVITIES AGAINST SUBMARINES):

(*a*) *78th Schedule April 23, 1918. American center at Ile Tudy.*

At eleven thirty a. m., eight miles north of Penmarch, a section of American seaplanes from Ile Tudy, escorting a convoy, sighted a very neat wake parallel to the convoy. Bubbles could be seen rising to the surface. As the plane was brought into bombing position, a dark object was seen and two bombs were dropped which exploded well. A phosphorous buoy was dropped on the spot, and one plane circled in the neighborhood while another went to meet an American destroyer, the *Stewart*, to which a message was sent by means of a correspondence buoy. The destroyer then rushed to the spot indicated and dropped some depth charges, which brought more bubbles to the surface. Oil and black water came to the surface, also a reddish substance. The next day a plane passed these latitudes, and a large spot of oil could be seen on the sea. On the fifth and sixth of May, this spot was still seen by aviators, and it is considered that a submarine was actually sunk.

(*b*) *89th Schedule, May 30, 1918. American center at Le Croisic.*

At 8:45 p. m. a floating mine was discovered and destroyed, two miles northwest of the lighthouse at La Banche.

(*c*) *98th Schedule, June 25, 1918. American center at Le Croisic.*

A seaplane from Le Croisic left in answer to an "allo signal," and a suspicious wake was perceived. After having carefully explored the region, and escorted a ship through this section, a large spot of oil was sighted, about five miles from the suspicious wake previously seen. An F. bomb was dropped but nothing else was observed, and the plane was forced to return to the base because of motor trouble.

(*d*) *110th Schedule, July 5, 1918. American center at Ile Tudy.*

A section of two seaplanes left in search for a submarine reported in the Bay of Audierne. A suspicious wake was discovered, extending several hundred meters from west to east. It was perfectly visible, and advanced gradually.

After having marked the spot with a phosphorous buoy at 10:18 a. m. the two seaplanes dropped their bombs in advance of the wake. One of these did not explode.

Several minutes afterward, there was a big explosion and a large amount of water splashed up. This explosion seemed to be very strong, especially to have been caused by the func-

tioning of the bomb which had failed to function at first. The only thing observed was a small amount of oil on the surface directly afterward.

It is not possible to explain the violent explosion, but it is probably due to the delayed functioning of the bomb. It could not have been the destroying of a submarine since no débris rose to the surface, and later searches brought no result.

(*e*) *126th Schedule. American center at Ile Tudy.*

August 3, 1918. Six bombs were dropped on a suspicious wake in the vicinity where a boat had been sunk.

August 7, 1918. Two bombs were dropped on a suspicious wake in the neighborhood of a convoy.

August 10, 1918. Two bombs were dropped on suspicious bubbles.

August 13, 1918. One bomb was dropped on a suspicious wake.

(*f*) *136th Schedule. American center at Ile Tudy.*

September 27th, 1918. Two bombs were dropped on a suspicious wake.

(*g*) *143d Schedule. American center at Fromentine.*

October 14th, 1918. Two seaplanes discovered an oily wake thirty miles south of Ile d'Yeu. Two bombs were dropped, one 100 meters in advance of the wake and another directly on the wake. The first bomb did not produce any apparent result, but the second brought large black oily bubbles which continued to rise for fifteen minutes.

October 22, 1918. At the American center at Ile Tudy.

(a) At 10:18 a. m., a section sighted an oily spot and two bombs were dropped which brought a great deal of oil to the surface.

(b) At 10:19 a. m., another section bombed a suspicious wake two miles South of Penmarch.

(c) At 11:45 a. m., a section dropped two bombs on a suspicious object which was perhaps a mine.

(d) At 2:06 p. m., a section bombed a suspicious object two miles southwest of Penmarch, but the bombs did not explode.

(e) At 2:17 p. m., another section bombed an oil spot and a great deal of oil and bubbles rose to the surface. (Seaplanes from the French station at Camaret assisted in this attack).

October 26, 1918.

(a) South of Guilvenec a section released two bombs on some oil bubbles.

(b) Four miles southwest of Penmarch a section dropped two bombs on a trail of oil.

2. EXTRACT FROM THE ARCHIVES OF THE AERIAL PATROLS OF THE LOIRE.

March 21, 1918. American Dirigible center at Paimbeouf.

The dirigible *At–1* dropped bombs on a suspicious object, which seemed to be a submarine, in front of a convoy.

On *October 1, 1918*, the Dirigible *At–13*, patrolling before a convoy going from La Pallice to Quiberon, discovered an enemy submarine on the surface, ten miles south of the light-house of Le Four. The late hour, the weather conditions, and the orders given for the care of dirigibles, did not permit the dirigible to repulse the attack by the submarine. Nevertheless, the dirigible returned to the convoy and certainly saved it from being torpedoed by giving the warning in time.

3. OBSERVATIONS.

After the above instances have been enumerated, the Bulletins of the Submarine War avoid the discussion of the results effected by the attacks, especially as no information can be considered entirely accurate in regard to the results. Therefore, from these items it would not be possible to appreciate the assistance rendered by the U. S. Naval Aviation Forces, and to be just, it is necessary to state the following:

"The entrance into the service of the Franco-American Aerial Patrols of the Loire, acting in absolute cooperation with the reorganized and increased surface patrols, broke the blockade by enemy submarines of the French coast, and enabled the authorities to receive accurate information regarding the location of enemy submarines, besides compelling them to cruise in regions where navigation was not very extensive.

"In fact, it can be stated that during the ten last months of the war, only three ships were torpedoed or destroyed by cannon in our patrol area (that is to say, between the Point of Penmarch and Ile d'Yeu), whereas in the same region we lost on the average of one ship a day when, in May 1918, the Aerial Patrol Service of the Loire was created.

"The U. S. Naval Aviation Service controlled a large part of this success, which may be qualified as brilliant, since it is figured that the efficacy of the submarine war was reduced 99%."

ANTI-SUBMARINE OPERATIONS ON CHANNEL-ATLANTIC COAST OF FRANCE BASED ON BULLETINS DE LA GUERRE SOUS-MARIN AND EXTRACTS FROM ARCHIVES OF THE FRENCH AIR DISTRICTS.

[(Z. A. B.)—Zone Aerienne de Bretagne. (Z. A. L.)—Zone Aerienne de la Loire. (Z. A. G.)—Zone Aerienne de Gascogne. (Z. A. N.)—Zone Aerienne de Normandie.]

Table based on Bulletins de la Guerre S/M and French Archives.

U. S. Naval Air Stations.

ILE TUDY (Z. A. L.)

(In operation nine months.)

	Fr. Figs.	U. S. Figs.
Allos and SOS calls rec'd	66	
Alert flights in response	42	
Submarines sighted	18	6
Submarines attacked	18	6
Submarines damaged	7	3
(2 severely, 2 destroyed.)		

ST. TROJAN (Z. A. G.)

(In operation five months.)

Allos and SOS calls rec'd	57	
Alert flights in response		
Submarines sighted	3	2
Submarines attacked	3	2
Submarines damaged	2	0
(Possibly destroyed 1.)		

LE CROISIC (Z. A. L.)[1]

(In operation 12 months.)

Allos and SOS calls rec'd	28
Alert flights in response	24
Subs and mines sighted	2
Mines destroyed	1

FROMENTINE (Z. A. L.)[1]

(In operation four months.)

Allos and SOS calls rec'd	13
Alert flights in response	8
Submarines sighted	1
Submarines attacked	1
(Possibly destroyed 1.)	

PAIMBEOUF (Z. A. L.)

(In U. S. operations 8 mos.)

Submarines sighted	5	1
Submarines attacked	3	0
Submarines damaged	2	0
(One defended itself by gunfire.)		

Table based on Bulletins de la Guerre Sous-Marin only.

French Air Stations.

CAMARET (Z. A. B.)

(In operation 22 months.)

Submarines sighted	15
Submarines attacked	15
Submarines damaged	5
(Probably destroyed 1.)	

GUERNSEY (Z. A. N.)

(In operation 14 months.)

Submarines sighted	12
Submarines attacked	11
Submarines damaged	4
(Probably destroyed 2.)	

BAYONNE (Z. A. G.)

(In operation 12 months.)

Submarines sighted	6
Submarines attacked	6
Submarines damaged	2
(Possibly destroyed 1.)	

LA PALLICE (Z. A. G.)

(In operation 12 months.)

Submarines sighted	2
Submarines attacked	2
Submarines damaged	2
(Possibly destroyed 1.)	

TREGUIER LA PENZ (Z. A. B.)

(In operation 18 months.)

Subs sighted and attacked	1

LE VERDON (Z. A. G.)

(In operation 12 months.)

Subs sighted and attacked	2

HOURTAIN (Z. A. G.)

(In operation 12 months.)

Subs sighted and attacked	1

LORIENT (Z. A. L.)

(In operation 12 months.)

Subs sighted and attacked	1

[1] No U. S. figures.

Table based on Bulletin de la Guerre S/M and French Archives—Contd.

L'ABER VRACH (Z. A. B.)

(In operation three months.)

Allos and SOS calls rec'd	1	1
Allo flights in response	1	1
Mines sighted and reported	2	2

Information unavailable as to scout patrols hunting for submarines. Estimated at two per three allo calls.

Table based on Bulletins de la Guerre Sous-Marin only—Contd.

GUIPAVAS (Z. A. B.)

(In operation 12 months.)

Subs sighted and attacked	1

ROCHEFORT (Z. A. G.)

(In operation 12 months.)

Subs sighted and attacked	1

U. S. NAVAL AVIATION (SEAPLANE) CONVOY PATROLS—BASED ON U. S. NAVAL AVIATION INTELLIGENCE REPORTS.

	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
LE CROISIC.										
Convoys reported [1]	56	62	60	.....	60	62	62	60	62	24
Convoys sighted	.....	5	13	.....	14	14	14	30	40	8
Convoys escorted [2]	.....	.....	11	.....	8	10	8	26	26	6
Days fit for flying	20	20	21	18	21	24	24	18	18	5
ILE TUDY.										
Convoys reported [1]	.....	38	60	62	60	62	62	60	62	24
Convoys sighted	.....	17	20	39	47	36	56	28	41	15
Convoys escorted [2]	.....	.....	20	39	47	36	56	28	41	13
Days fit for flying	.....	14	16	20	23	16	22	17	23	6
ST. TROJAN.										
Convoys reported [1]	.....	.....	.....	.....	.....	22	70	66	70	5
Convoys sighted	.....	.....	.....	.....	.....	10	.....	20	25	2
Convoys escorted [2]	.....	.....	.....	.....	.....	5	.....	14	8	.....
Days fit for flying	.....	.....	.....	.....	.....	21	26	22	24	5
FROMENTINE.										
Convoys reported [1]	.....	.....	.....	.....	.....	.....	10	60	61	22
Convoys sighted	.....	.....	.....	.....	.....	.....	4	19	38	6
Convoys escorted	.....	.....	.....	.....	.....	.....	1	11	28	3
Days fit for flying	.....	.....	.....	.....	.....	.....	25	20	20	5
L'ABER VRACH.										
Convoys reported [1]	.....	.....	.....	.....	.....	.....	.....	10	42	12
Convoys sighted	.....	.....	.....	.....	.....	.....	.....	10	18	8
Convoys escorted [2]	.....	.....	.....	.....	.....	.....	.....	10	16	6
Days fit for flying	.....	.....	.....	.....	.....	.....	.....	18	22	8

([1]) Convoys reported the day before for escort, by French Air District Commandant.
([2]) Convoys escorted through station area by seaplane patrols.

The United States Naval Air Stations at Treguier, Brest, and Arcachon began operations so late that they had no convoy escort patrols to report.

The figures in the above report are compiled from graphic monthly operations reports prepared by the Station Aviation Intelligence Officers and forwarded by the Commanding Officers in response to letters from Aviation Headquarters, Brest, calling for this information.

CITATIONS OF UNITED STATES NAVAL AVIATION STATIONS.

(Taken from French Reports.)

1918.

21 Mar. Paimbeouf bombed suspicious object in front of a convoy.
30 Mar. 20:45 Le Croisic destroyed floating mine near La Banche buoy.
23 Apr. 12:00 Plane from Ile Tudy possibly destroyed enemy submarine near Pt. Penmarch.
25 June. 19:10 Le Croisic bombed oil spot near Le Banche buoy.
5 July. 10:18 Ile Tudy plane possibly destroyed enemy submarine in Bay d'Audienne.
3 Aug. Ile Tudy Planes dropped six bombs on suspicious eddy and wake.
7 Aug. Ile Tudy bombed suspicious eddies and wakes near a convoy.
Ile Tudy possibly destroyed enemy sub near an important convoy.
10 Aug. 12:13 Paimbeouf and Ile Tudy sighted and attacked submarine near Pt. Penmarch.
13 Aug. Ile Tuby bombed suspicious eddy.
15 Aug. 7:40 Ile Tudy attacked submarine near Pt. Penmarch.
27 Sept. 15:00 Ile Tudy possibly destroyed enemy submarine near Pt. Penmarch.
1 Oct. Paimbeouf sighted submarine on surface in front of convoy near Phave du Four.
2 Oct. 11:00 Paimbeouf fired on by submarine near Ile d'Yeu.
13 Oct. 12:15 Paimbeouf attacked submarine off Balemes.
13 Oct. 14:15 St. Trojan attacked and damaged submarine SW of Les Sables d'Ilenne.
14 Oct. Fromentine attacked and damaged submarine south of Ile d'Yeu.
18 Oct. 11:40 Ile Tudy sighted submarine near Pt. Penmarch.
22 Oct. 10:18 Ile Tudy damaged enemy submarines.
10:19 Suspicious object bombed south of Pt. Penmarch by Ile Tudy.
22 Oct. 11:45 Ile Tudy destroyed mine in convoy route.
14:06 Suspicious object bombed by Ile Tudy SW of Pt. Penmarch.
14:20 Ile Tudy possibly destroyed submarine near Pt. Penmarch.
26 Oct. Ile Tudy possibly destroyed submarine sighted near Convoy.
Ile Tudy bombed oil streak SW of Pt. Penmarch.
Ile Tudy bombed oil spot and air bubbles.
27 Oct. 11:00 Submarine attacked by Ile Tudy near Pt. Penmarch.

CITATIONS—FRENCH AND U. S. NAVAL AIR STATIONS.

(Taken from French Reports.)

1918.

31 Jan. Submarine bombed by Guernsey near Hanois.
17 Feb. Camaret bombed submarine north of Ile Vierge.
26 Feb. Camaret bombed submarine north east of Four.
4 Mar. Guernsey bombed suspicious wake near Portland.
27 Mar. Submarine probably sunk by Camaret near Creach.
22 Apr. 9:05–10:00 Camaret bombed submarine off Ouessant.
23 Apr. 18:30 Guernsey sighted submarine off Roches Douvres.
26 Apr. 9:10 Camaret damaged submarine near Armen.
6 May 13:06–19:20 Guernsey badly damaged submarine at sea.
6 May 20:15 Guernsey damaged submarine off Roches Douvres.
9 May 19:30 Camaret bombed submarine near Ile Vierge.
15 May 19:20 Camaret sighted submarine off Ushant.

1918.

21 May. 16:40 Treguier bombed submarine near Stiff.
16:40 Same submarine bombed by La Penze.
23 May. 13:35–15:20 Guernsey possibly sunk submarine near Jeibourg.
25 May. 19:30 Camaret probably damaged submarine near Creach.
26 May. 14:30 Camaret bombed submarine south of Cape d'Andrienne.
31 May. 7:40 Guernsey bombed submarine near Tuagoz, while attacking a ship.
7 June. 6:00 Guipavas bombed submarine off Guz Nez.
9 June. 1:05 Guernsey bombed submarine east of Benghead, Eng.
25 June. 19:10 Le Sables sighted submarine west of Banche (bombed by Le Croisic U. S.).
30 June. 9:30 Bayonne bombed submarine near St. Sebastian.
3 July. 18:45 Guernsey bombed submarine NW of Casquetto.
4 July. 9:25 Camaret and La Penze sighted submarine NW off Ile Vierge.
7 July. 8:10 Rochefort bombed submarine SW off Verzoyes.
8 July. 12:40 Guernsey bombed submarine west of Guernsey.
9 July. Le Verdon sighted suspicious wake and guided patrol to it.
16 July. 18:00 Guernsey sighted submarine off Portland Bill, Eng.
19 July. 10:00 Bayonne sighted submarine off Biaintz.
22 July. 14:12 Bayonne bombed submarine off Cape Breton.
23 July. 10:00 Bayonne bombed submarine off Biaintz.
29 July. 14:00 Camaret bombed submarine NW of Ushant.
10 Aug. 12:13 Guipavas bombed submarine (C. M. 4) off Penmarch.
10 Aug. 14:40 La Pallice probably damaged submarine 40 miles west of Le Croisic.
11 Sept. 17:00 submarine bombed by Bayonne near Casquetto.
17 Sept. Plane and dirigible—Le Sables bomb suspected spot.
19 Sept. Camaret bombed submarine near Roz de Sein.
27 Sept. 11:00 Lorient bombed submarine off Pt. Penmarch.
2 Oct. 11:25 Le Sables sighted submarine 15 miles SW of Le Sables and fired on with aero cannon.
4 Oct. 8:30 Bayonne sighted submarine NW of Casa Blanca.
11 Oct. 10:00 Camaret damaged submarine off Penmarch.
11 Oct. 12:05 Bayonne damaged submarine off Cape Breton.
13 Oct. Houstin sighted submarine at 16:29.
17 Oct. 11:40 Camaret bombed submarine off Penmarch.
22 Oct. 14:20 Camaret damaged submarine off Penmarch.
22 Oct. 15:20 Le Verdon sighted submbarine SW of Coubie.
26 Oct. 16:00 Houstin bombed submarine 12 mi. NW of Houstin.
26 Oct. Le Verdon bombed submarine 12 mi. NW of Houstin.

NAVAL AVIATION ACTIVITIES.

Source: Weekly Report of Aviation.

21 April 1919.

Ordnance.

After a week's preparation, during which targets were built, machines equipped, and practice planned, the Ordnance Department successfully inaugurated the first tests under "Orders for Gunnery Exercises (Aircraft) 1919." The pilots have been paired off and lively competition between teams has resulted.

A board of umpires has been selected who are acting as observers under the direction of the Gunnery Officer, and all practices are being conducted with a desire to make Hampton Roads the "E" Air Station of the Navy.

Targets have been built and placed in Willoughby Bay and two towers on the East bulkhead have been utilized as observation towers for plotting the fall of bombs. The gunnery targets are so built that the canvas on each can be changed after each flight and scores counted.

Unusually good results have been obtained with the Camera Gun and the Lewis Machine Gun. With the latter it is necessary to keep patching up targets on account of the excellent aim of the Gunners, and with the Camera Gun vulnerable hits seem to be the rule rather than the exception.

Communication.

Each of the five H–16's arriving from Guantanamo carried radio equipment, which proved of great value and provided dependable communication both with the fleet and with the other aircraft. Signals from the planes were readable at this station several hours before the arrival there. The installations consist of CP 1110 transmitters and SE 950 receiving sets.

Radio.

Experiments and tests have been carried out on subterranean wires; heavily insulated wires laid about two feet below the surface. They are highly directional and are extremely selective. Signals from seaplanes and from the lowpowered set at the Bureau of Standards have been copied through the interference of Arlington's high powered spark set. Signals have been received from seaplane stations about forty miles, seaplanes using Cutting-Washington type transmitter. So far, only a north and south wire has been laid down; the addition of an east and west wire will increase the receiving range from seaplanes which are more nearly in this position.

Antenna measurements on all types of seaplane antenna, single and double trailing and skid fin, are being conducted on seaplanes from this station by the General Electric Co. Much valuable data will be available upon completion.

Experiments are being made by Bureau of Standards, Radio Division, on loop type antenna for use on airships. The loop is fastened to lines suspended between two radio masts, and is so arranged that the size and shape of the bag can be exactly reproduced. Heavy rains and high winds caused one mast to fall down before sufficient data was obtained to determine the practicability. The tests are to be continued.

Pigeons.

The pigeons that were received here from France are being mated and settled, and it will not be long before young stock will be available for other stations, from the very best flying strains of France, England and Belgium.

These birds have all seen active service at the front. One bird in particular averaged three messages a day for the last month of the war. There will be some of these birds on exhibition at the Aerial Show to be held at Atlantic City during the month of May. Thirty pigeons have been shipped to the Naval Air Station, Morehead City, N. C., and ten pigeons to the Naval Air Station, Miami, Fla., where lofts are to be established.

Source: Weekly Report of Aviation.

28 April 1919.

GUNNERY.

The new Davis gun target is now complete and will be used at the first opportunity.

A Hochkiss S-A three-pounder has been received and will be used as a Fog Gun.

RADIO.

During the past week the radio installation on one of the Dirigibles was tested with the most gratifying results. Wireless telephone signals were received so loudly that they were audible in all parts of the operating room without the use of a loud speaking amplifier.

A Radio test was conducted at the Naval Experimental Station, New London, Conn., Friday, April 18, 1919, between H–16 *A–3519* and Submarine *H–2*. Flying time for test was two hours and five minutes. Very good results were obtained.

H–16 Radio Test, taken on Submarine H–2.

Audibility.

	500	2 stages amplification.
	20	detector.
	3000	2 stages amplification.
	30	detector.
	1000	2 stages amplification.
	50	detector.
Lead-in partly out of water.	2000	2 stages amplification.
	20	detector.

An audibility of 10 in detector gives a signal of great enough intensity to operate the amplifier and torpedo control relay and apparatus. The torpedo must run not nearer than 6 feet to the surface of the water.

The submarine radio equipment consists of SE 143 receiver, SE 1071 audion control panel and SE1000 A amplifier.

Test No. 1. Between Submarine H–2 and Ocean Beach Radio Station.

The submarine *H–2* was anchored two miles off shore from Ocean Beach and the antenna (600 feet long, supported by floats at a depth of one foot) stretched out straight by the pull of the tide and in a direction such that the angle made with the Beach Station measured 45 degrees. The Submarine was now submerged to periscope depth and the received signal strength measured. The transmitter consisted of ¼ K. W. pliotron putting 3 amperes undamped radiation current at 1600 meters into an antenna of 500 meters fundamental wave length. The best reading gave 15 audibility, which is within the control relay range of signal strength.

Test No. 2. Between Submarine H–2 and Hydroplane H–16.

The above antenna conditions were duplicated and the plane circled the Submarine at a distance of 1½ miles at an altitude of 2000 feet, transmitting with a (Type SE1100) ¼ K. W. pliotron set putting 1 ampere at 1600 meters into a 400 foot trailing wire. The best reading gave 50 audibility which compares very favorably indeed with the reading taken from Beach Station.

The tide was at ebb in the Test No. 2 and did not pull strong enough on the antenna to keep it out taut, so that between the 1 foot float support points the wire sagged to 4½ feet, the antenna in this case averaging considerably deeper than 1 foot.

From the above encouraging results, several more hydroplane tests will be made with the antenna at different depths down to six feet or more.

PIGEON DEPARTMENT.

Weather the past week has been such as to cut down training entirely. Added keenness for the loft and nest has been exhibited by the old birds on account of the first youngsters of their season making their appearance. Undoubtedly, the majority of the work for the next two or three years will be performed by birds of this year's breeding and great care will be taken so that only the physically fit will be raised. Much more efficient work can be expected of birds raised on the station, as the dislike for the water always shown by birds raised inland will be to a great extent eliminated.

On Wednesday, April 16, twenty birds from the loft at Morehead City, N. C., were sent to Southport, N. C., for flock liberation. The birds were liberated at 7:35 a. m. with a strong Southeast wind

blowing. Eleven of the birds homed at 10:25 a. m. the same day, making the one hundred and eight mile flight in two hours and forty-six minutes. Five other birds returned at various intervals up to Friday evening, and four birds are still out. This is the longest flight that has been made by birds at this station.

Thirty birds were released on April 18, fifteen miles southwest of Montauk, L. I. All returned to Montauk in good condition in one hour. Of the twelve birds released April 10, six are still missing.

BOMBING AND GUNNERY.

The gunnery exercises were continued; all officers eligible finished the first two bombing practices, while about half of the number finished the Davis gun and Camera gun practices. The Mark III bomb sight was used in dropping the bombs, and very good results were obtained. The pilots were required to find their own wind velocity and direction at the altitude from which they were bombing before dropping the bombs. The bombing was done with sub-calibre smoke bombs at 1000 feet and 2500 feet and each pilot dropped twelve bombs from each altitude.

Ten pilots fired five rounds each with the Davis gun with very good success, considering the small amount of previous practice they had had with this gun. Nearly every pilot made at least one hit. Eleven pilots shot one reel each with the Camera Gun. Two H boats were sent up with two pilots and a Camera Gun mounted on each boat. The boats flew about each other in such a manner that the gunners in both machines could fire at each other. The results were very satisfactory.

Two bombing observation protractors, constructed from blue-prints from the Bureau of Ordnance, will be used in observing the bombs dropped in the towed target practice and live bomb practice next week. Several sleeves are being made up from airplane fabric for the towed sleeve machine gun practice.

All machines have been equipped as fully as possible with the ordnance equipment available on the station. They all have scarf ring machine gun mounts and bomb launching gear. Seven machines have Mark III sights and the others are filled with sight mount blocks so that a sight may be changed from one machine to another in a very short time.

SPOTTING FROM AIRCRAFT.

Source: Lieut. Commander E. O. McDonnell, U. S. N.

18 February 1919.

During the long range spotting practice held on February 17th, the *Texas* 2 seater reconnaissance and spotting airplane number 2 (Sopwith 1½ strutter) was used for spotting practice as per instructions from the Fleet Gunnery Officer. The pilot and spotter was Lieut. Comdr. E. O. McDonnell and observer and radio operator Ensign C. D. Palmer.

Throughout the practice the radio telephone on the airplane worked perfectly and was distinctly heard on the *Pennsylvania* and other ships. The *Pennsylvania* did not communicate with the airplane, as the Fleet telephones were not used because of breakdowns.

The second string firing was spotted and recorded with the following results, showing the airplane spots and the rake observations:

Second string.

No.	Airplane.	Spotter.	Rake.	Observer.
16	Up 800	RO1	S 880	LO1
17	Up 100		S 220	
18	Up 50		S 80	
19	No correction		S 60	
20	Up 100		S 100	

The third string was then spotted with a heavy smoke screen made by destroyers. The spots for this string were sent to the *Pennsylvania* from the airplane and were heard on the *Pennsylvania*. The airplane did not receive word from the *Pennsylvania* and could not tell the number of the salvo. A record, however, was kept and strings identified by the smoke screen and the time.

Third string.

No.	Airplane.	Spotter.	Rake.	Observer.
21	Up 400	LO2	S 580	RO6
22	Down 200		O 270	
23	Down 300		O 350	
24	Down 300		O 300	
25	Up 200		S 210	

This gave an average error of 64 yards. This is many times better than was done by the ship spotters.

The position taken by the airplane was approximately at a horizontal distance from the target of 5,000 yards and an altitude of 4,000. This is a position that could be maintained as far as anti-aircraft from the target is concerned. Equally good spotting could be

done, however, from a range of 10,000 yards and an altitude of 8,000 feet.

The following points may be noted:

1. This was the first time Lieut. Comdr. McDonnell had ever spotted range for day gun firing.

2. It was extremely easy to see exactly where each shot of each salvo landed and to estimate the size of the pattern and the distance of the center of impact of the salvo from the target.

3. With a little practice the spotter believes he could spot firing from any range with an average error of 25 to 50 yards.

4. The airplane can under any conditions spot very much better than the ship's spotter and can spot under many conditions when the ship's spotter cannot spot at all.

5. The airplane can also give additional fire control and tactical data such as change of course and formation, movements of other units, reinforcements, etc.

6. Before an engagement a spotting airplane such as the one now used could take the air from the ship's turret and remain aloft for five hours, keeping in constant communication with telephone from 10 to 50 miles and telegraph from 100 to 150 miles.

7. The airplane phone has been used with a shore station receiving at 125 miles.

8. The flight on February 18th lasted about two hours and twenty minutes.

9. The spotter believes with a little practice he will be able to spot concentrated fire with the aid of stop watch, compass, and telephone directions from the ship.

AIR SPOTTING PRACTICE.

Source: Naval Aviation.

April 1919.

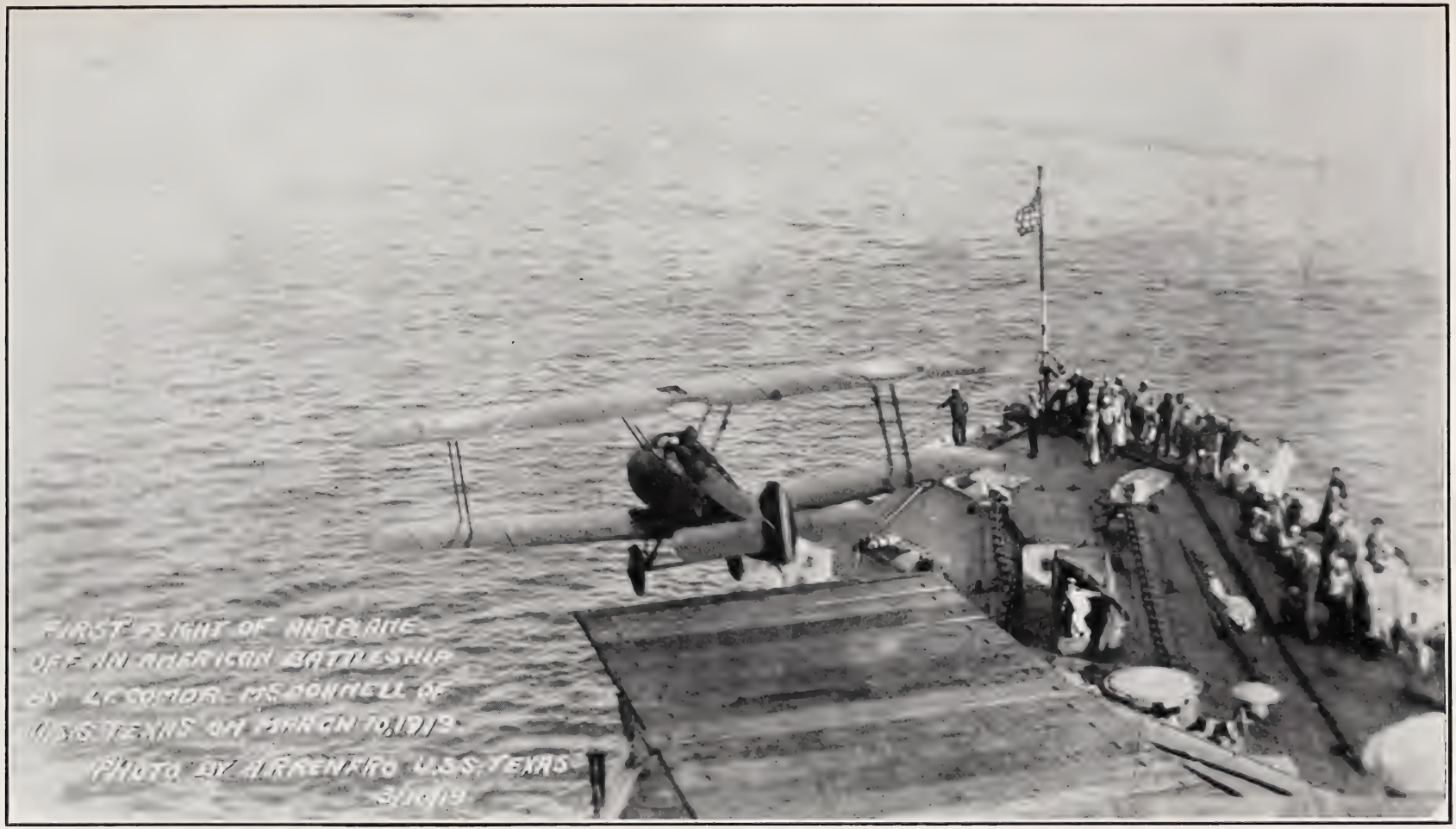
This practice was fired as an individual practice while in Division Formation. The firing was done in the open sea under favorable weather conditions, but unfavorable conditions insofar as smoke interference was concerned. Changes of course during the firing did not involve particular difficulties but the smoke interference was bad. Prior to the practice, and foreseeing such difficulties, it was decided to use the observing airplane assigned to this vessel for spotting. In addition, a balloon was sent to this vessel with the idea of employing it for spotting. The balloon, unfortunately, proved a nuisance in that the pilot had to be hauled down and disembarked from the balloon just at the time that the run was started. The airplane, however, proved of particular value in spotting.

APPENDIX.

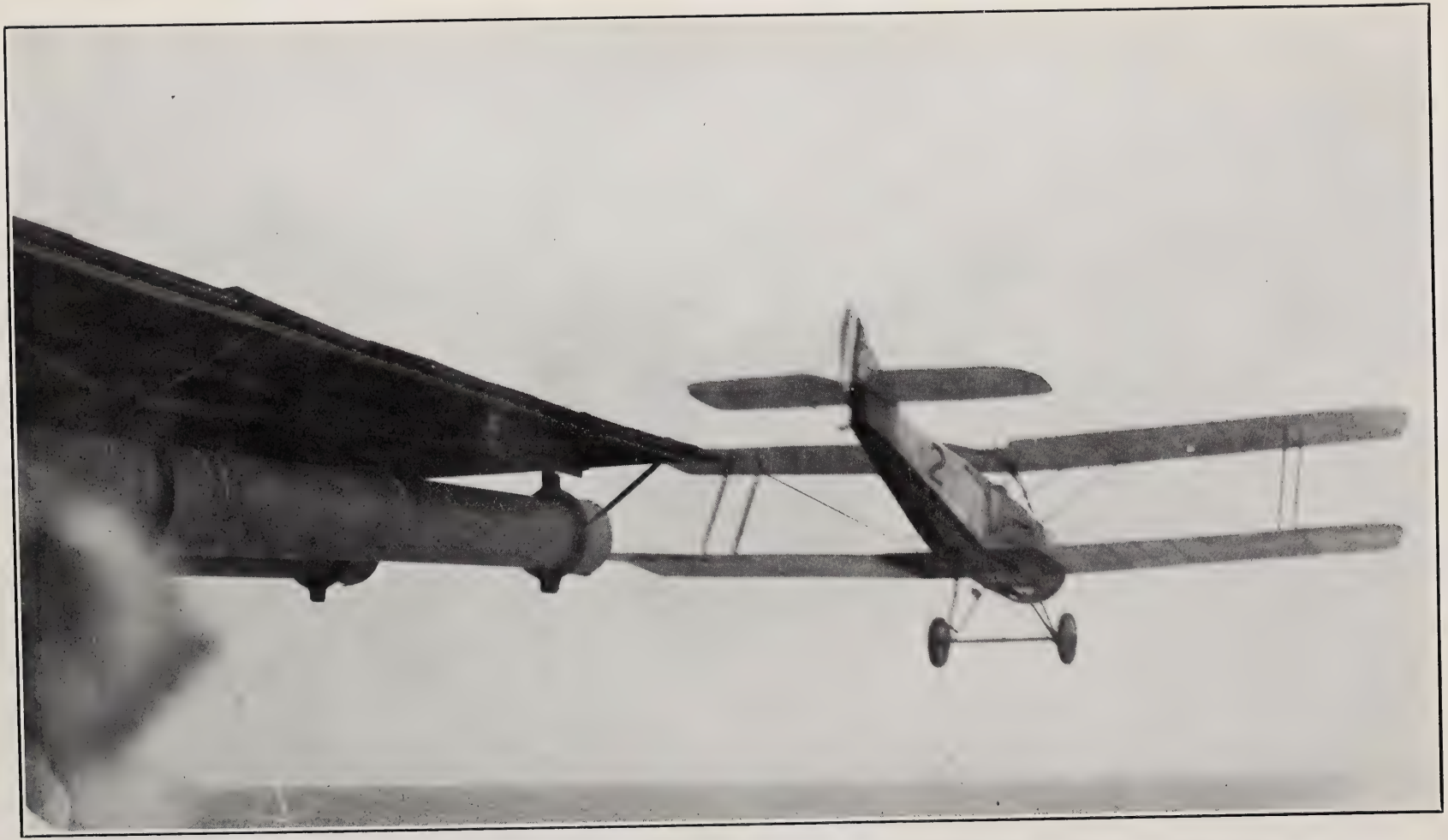
MONTHLY INFORMATION BULLETIN, NUMBER 5—1919.

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE—5 APRIL TO 5 MAY, 1919.

Subject.	Date.	Pages.	Reference number.	Remarks.
AVIATION:				
General aeronautical information, England	14 Mch. 1919	12	11265	Press Review on Aviation, week ending 8 March 1919: From office of Force Commander, United States Naval Forces operating in European Waters.
Aircraft, technical note	5 Apr. 1919	5	10212 P	Auxiliary blowers for airships.
COMMUNICATIONS:				
Radio	26 Feb. 1919	6	11474	Wireless stations in Holland.
Wireless telegraphy, Chile	6 Nov. 1918	1	401	Chart giving information on various wireless stations in Chile.
Inter-Allied Radio telegraphic Commission	27 Mch. 1919	20	8306 S	Protocol of proceedings of the technical Sub-Commission held 27 March 1919.
The railway system of Esthonia	7 Apr. 1919	2	11436	A report showing mileage and rolling stock of railways in Esthonia.
Fast passenger Lines	21 Mch. 1919	2	11562	Wanted: Fast passenger lines on the East Coast of South America.
CONSTRUCTION AND REPAIR, Aviation	11 Mch. 1919	22	10212 D	Aircraft technical note No. 139—the rigging of aeroplanes.
INTERNATIONAL SITUATION:				
Chinese political notes	31 Jan. 1919	26	11023 c	Summary of events in various consular districts.
Political and Military situation in Armenia	12 Feb. 1919	3	11499	Notes from American Commissioner at Constantinople.
Chinese-Japanese Relations	14 Mch. 1919	2	11510	Editorial appearing in "Wasera", a Monthly Magazine.
Japanese Policy	14 Mch. 1919	6	11572	Articles on Japanese Policy published in "Central Review" and "International".
Ukraine	20 Mch. 1919	4	10422	A report on the present situation in Ukraine.
Italy	1919	121	11093	A book setting forth the Adriatic problem and Italy's aspirations; also pamphlets demonstrating the strain sustained by Italy in the War against the Central Empires; one pamphlet setting forth the military, political and economic considerations regarding the boundaries of Europe.
Japan	14 Mch. 1919	2	11399	Japanese views on the League of Nations. Source: Japanese Press.
Germany	1 Apr. 1919	6	11507	Report of interview with Dr. Krauss, one of the heads of the German Colonial Ministry, in which he explains something of the inside situation and feeling in Germany.
Contraband, Italy	3 Apr. 1919	1	5504	Articles considered as absolute contraband by Italian Government.
Germany	Dec. 1918–Mch. 1918	94	11593	A report by British officers on the economic condition prevailing in Germany.
NAVIGATION:				
Routing instructions	28 Feb. 1918	6	11465	Routing instructions—Rotterdam to Danzig, and Regulations governing United States Navy supply vessels during their stay in Rotterdam, Holland.
Mine fields in Adriatic and Mediterranean	12 Mch. 1919	2	4621 E	Sailing directions for entering Spezia; also list of the various mine fields in the Adriatic.
OPERATIONS:				
Prolongation of Armistice with Germany	14 Feb. 1919	69	11287 c	Report on the conferences held at Treves for the third prolongation of the armistice.
Enemy Mining Activities	17 Feb. 1919		11180	Map showing positions of all mines accounted for and mines found from beginning of activities until coast was declared clear of mines 17 Feb. 1919.
Chronology of the War	1914–15	211	11551	Issued under the auspices of the Ministry of Information. With this volume is published a separate War Atlas.
German Submarines	Mch. 1919		10352 F	Itinerary of all cruises of German Submarines to and from the American coast.
German Mines	1914–1918	56	11526	German statement of Mines laid by surface vessels and submarines of the Flanders Command.
United States Vessels (Naval and Aircraft) credited with destruction of or damage to enemy submarines.	28 Apr. 1919	2	11568	Telegram from Admiral Knapp at London.
Spanish ships, loss of	2 Apr. 1919	2	10446 a	A list showing names and tonnage of Spanish ships lost through sinking by submarine, mines, etc., during the years 1915, 1916, 1917, and 1918.
ORDNANCE:				
German Munitions	1 Feb. 1919	88	11050 II 11050 GG 11050 FF	Examination of German Munitions captured by the French Army Reports are written in French.
German Munitions	1 June 1918	205	11050 KK 11050 LL 11050 MM 11050 NN 11050 OO 11050 PP	Examination of German Munitions by the French Army. Reports are written in French.
German submarines			11478	Plans of German submarines U-*48* and U-*49*.
German Munitions	1 Oct. 1918	118	11050 WW 11050 XX 11050 YY	Examination of German Munitions by the French Army.
Smoke Material	1 Mch. 1918	5	11513	Hostile Munitions—Smoke Material of Nekel Topf Type.
STEAM ENGINEERING, Searchlights, and Signal Lights.	Nov. 1918	191		A book issued by Bureau of Steam Engineering for instruction of Officers and Personnel connected with Searchlights.
MISCELLANEOUS:				
German Intrigue in Russia	14 Mch. 1919	2	5750	Present German activities with reference to Russia. Also two pamphlets entitled "The German Grip on Russia," "The German-Bolshevik Conspiracy."
National Adjustment Commission	31 Dec. 1918	169	11531	Adjustment and control of wages, hours, and conditions of labor in the loading and unloading of vessels.
"Q" Boat adventures		289	11553	An interesting account of the adventures of English "Mystery" Ships. Written by Lt. Comdr. H. Auten, V. C., R. N. R.
Germany's Commercial Fleet	19 Apr. 1919	1	9904 H	Translation of an article from "Scheepskouw en Scheepvaart."
Propaganda	14 Apr. 1919	1	8742 A	German Propaganda in Spain.
Do	18 Mch. 1919	1	10207	German Propaganda in Uruguay.
British India	1912–13 to 1916–17	198	6621 B	Trade of British India with the British Empire and foreign countries.
Malay States	Feb. 1919	50	7262 B	Reports on the Unfederated Malay States under British Protection.
The German Naval Officer	29 Nov. 1919	4	10893 A	An article by Count Revenetow, "The German Naval Officer and the end of the German Fleet."
German Trade	1 Apr. 1919	2	11332	German Trade with Scandinavian countries.
Disabled sailors and soldiers	6 Mch. 1919	6	4702 J	Compensation for disabled sailors and soldiers under the workmen's Compensation Act, 1906.
Bolshevik activities	5 Mch. 1919	5	11246	Bolshevik activities in France in Spring of 1918.
Conditions in Mongolia and Trans-Barhalia	20 Feb. 1919	2	11461	Report on activities of General Semenoff in Siberia.
The League of Nations	3 Mch. 1919	8	10796 a	Attitude of neutrals towards League of Nations.
Shipbuilding in China	28 Feb. 1919	5	~~9028~~ 9928	Extracts from Peking Leader—Shipbuilding the Constructive Keynote in China. Shipbuilding facilities in China.
The Chinese Army	4 Mch. 1919	3	3210	A general description of the Chinese Army Divisions at present connected with the different leaders.
Russian Military Notes	21 Mch. 1919	7	11275	Russian Military and Naval Information—Translation from Russian.
Japanese shipping	28 Feb. 1919	6	11521	Standardization of merchant ships in Japan.
Mine sweeping Bulletin	27 Feb. 1919	31	4621 G	Mine Sweeping Bulletin, issued by Royal Hydrographic Institute of Genoa. These Bulletins are written in Italian.
Lunghai and Tungchung Railway—China	6 Feb. 1919	5	11504	A report on a proposed new railway and harbor improvement in China.
Iron-ore deposits in China	28 Feb. 1919	5	9596	Iron resources in Province of Kiangsu.
Conditions in Finland	18 Mch. 1919	9	9799 B	Economic, financial and political considerations.
Troop transports	Feb. 1919	29	11533	General specifications for fitting out Troop Transports.



FIRST FLIGHT OF AN AIRPLANE OFF AN AMERICAN BATTLESHIP BY LIEUT. COMMANDER McDONNELL, OF U. S. S. TEXAS, 10 MARCH, 1919.



AIRPLANE OF LIEUT. COMMANDER McDONNELL JUST LEAVING RUNWAY OF U. S. S. TEXAS ON FIRST FLIGHT OFF AN AMERICAN BATTLESHIP, 10 MARCH, 1919.

The smoke interference was so bad in the tops that the target was lost sight of frequently and after the third salvo was totally obscured. This necessitated shifting control of the directorscope and of the target bearing instrument to the Control Tower. The shift of control in target bearing came at the same time as a change of course, and the turrets, in following the pointer, got to the left of the firing ship. This resulted in two turrets throwing their firing switches and the turrets did not get on the target in time for the next salvo. Unfortunately the turret officers did not turn off the turret ready lights when they threw the firing switch and it was not known in Control that the two turrets were not ready. A further mistake resulted in depending on the rounds fired indicator. The fire of the battery was ceased when three turrets showed twelve rounds fired on their indicators. Later it was discovered that the operators in turrets four and five operated their transmitters for two rounds fired when their turrets actually missed the salvo.

The following is an extract from a letter to the Bureau of Steam Engineering pertaining to the communication by radio from the airplane:—

1. Type of airplane: Sopwith, one and a half strutter.

Radio installation on airplane as follows: Transmitter, C. G. 1104. Receiver, S. E. 950.

Intercommunication, Western Electric with Hampton Roads helmets, and Western Electric mouth transmitters.

Ship installation as follows: Transmitter, S. E. 1100 (Marconi tube transmitter); Receiver, S. E. 950; Extension phones and key were extended to the plotting room.

Pilot and Spotter, E. O. McDonnell, Lieutenant Commander, U. S. N., Observer and Radio Operator, C. D. Palmer, Ensign, U. S. N. R. F.

2. All spots were transmitted accurately by telephone and telegraph in the following manner:

Spot first repeated twice on telephone, then on buzzer telegraph.

3. The average time for transmission of spot from airplane to Plotting Officer was about five seconds. This could easily be cut down to two seconds with a little more drill.

4. This is the only airplane or seaplane that has depended entirely upon the telephone set for target practice spotting, and although the present radio telephone may not be as dependable as the radio telegraph, it certainly is a faster and more ideal method.

5. The spotting performed by the airplane was of particular value, as the view of the target from the ship was limited to the

fire control tower and other low positions after the third salvo. The remainder of the spotting for range was controlled absolutely by the airplane. Although the first three salvos were also spotted by the airplane, the ship was not entirely dependent upon the airplane spots. Communications were accurate both ways, receiving and sending.

6. The ship installation for the airplane work was entirely aircraft radio development, and operated by the ship's force, who gave excellent co-operation and efficient service.

7. The following prearranged program and list of signals show the communication established and the great help it was to both ship and airplane:

The U. S. S. *New York*, *Texas*, and *Arkansas* were underway for the range at about 7:45 a. m. The airplane was not taken on board on account of the uncertainty of the required amount of wind to fly off the turret. It later turned out that there was sufficient wind to fly off the turret but on account of the low powered airplane no chances were taken of delaying the practice. According to orders the *Texas* was to be the second ship to fire.

8. At 9:25 a. m. the *Texas* sent a signal to the airplane radio station at Guantanamo Bay as follows: "68D, Y3T: Have airplane come out immediately 09203 ans." This signal was acknowledged immediately and three minutes later the airplane was in flight.

The following is a list of call letters and signals sent:

Y3T—U. S. S. *Texas*.
68D—Airplane radio station at Guantanamo Bay.
68B—Spotting airplane.

9:29 a. m.	68D, 68B: How is my phone and telegraph? (This sent on both telephone and telegraph).
9:31 a. m.	68B, 68D: Both phone and telegraph excellent.
9:33	Y3T, 68B: Listen for me on both phone and telegraph for 5 minutes and report on signals.
9:38	68B, Y3T: Get U fine on both phone and telegraph.
9:39	Y3T, 68B: Now halfway out.
9:43	Y3T, 68B: Can now see you O. K. Will be there in 5 minutes.
9:45	68B, Y3T: IOK. Get U fine.
9:49	Y3T, 68B: Have arrived over you, when do you start firing?
9:50	68B, Y3T: Now on range.
9:52	Y3T, 68B: Target angle 300 degrees.



FIRST FLIGHT OF AIRPLANE OFF U. S. S. MISSISSIPPI.



AUSTRIAN KAPPA LIGHT BOMBING PLANE.

Taken after armistice.



FIRST FLIGHT OF AIRPLANE OFF U. S. S. MISSISSIPPI.



AUSTRIAN KAPPA LIGHT BOMBING PLANE.

Taken after armistice.

9. The following signals are those sent by 68B only, and all were instantly acknowledged by Y3T, excepting one, which was repeated with only ten seconds' loss of time:

9:58 a. m.	Target angle 300 degrees, change course 10 degrees right.
10:06	Target angle 290 degrees. Speed of target 6 knots.
10:07	Down five hundred.
10:08	Down four hundred.
10:09	Down two hundred.
10:10	Down three hundred.
10:11	Up five hundred.
10:12	Up five hundred.
10:15	Y3T, 68B: Is that all for us?
10:16	68B, Y3T: Stand by, think we are going to fire another salvo.
10:17	Y3T, 68B: IOK. How did you get those spots?
10:18	68B, Y3T: IOK. Excellent.
10:20	68B, Y3T: No, we will not fire any more, you can go in.
10:21	Y3T, 68B: We are on our way; keep on my tune, I will give you position reports until we get over you.
10:25	68B, 68D: IOK, Get U fine.
10:36	68D, 68B: Now half way in. Try your Marconi phone.
10:37	68B, 68D: IOK. This is 68D on telephone 600 meters, how do you get me?
10:40	68D, 68B: Get your phone good. We are now eight miles S. W. of Guantanamo Bay.
10:48	Landed at Airdrome.

10. The spots were received accurately on board ship with the exception of the first spot. Owing to interference it was necessary to have the airplane repeat this spot. This interference, it is thought, was due to the hydroplanes working with the other vessels at the same time. The phone communications for the fifth and sixth salvos were excellent. It is not believed that the C. G. 1104 transmitter is the ultimate radio telephone for ships planes.

COMMUNICATIONS.

VACUUM TUBES FOR RADIO USE.

Source: Bureau of Standards.

15 April 1919.

(9802)

Several conferences on vacuum tubes with representatives of other departments have been held, and it has been agreed that the Signal Corps, the Navy Department, and the Bureau shall work in co-operation in standardizing a type of receiving tube and a standard testing set for receiving tubes.

Reports have been prepared on the measurement of detector sensitivity characteristics of power tubes, method of computing amplification constant and output resistance from the geometry of a tube, and on an investigation of the output of large power tubes.

Using the special equipment which has been developed for instantaneous measurements of characteristic curves of power tubes, curves have been obtained for power tubes, for kenotrons and for pliotrons as rectifiers. A pliotron rectifying system has been set up and tried out.

A study has been made of the factors which limit the output of power tubes. This involved experimental work with a low frequency oscillograph and a theoretical study of the relations of the currents involved. A study has also been made of the harmonics produced in a vacuum tube generating circuit and of their relations to the fundamental current produced.

In studying the detector action of receiving tubes, apparatus has been developed by which the measurement of sensitivity of tubes can be made within one percent. A study has been made of the change of sensitivity with wave length, which was found to be negligible.

VARIATION OF DIRECTION OF RADIO WAVES.

Source: Bureau of Standards.

15 April 1919.

(9802)

Various observers have recently noted that the apparent direction of a sending station changes from time to time. Observations made at the Bureau on signals from a long wave station have corroborated the results obtained by others with regard to the variation of the observed direction. This variation is very great during the night hours and small in the day time. The variations were somewhat reduced when the direction finder was placed in a shielded case.

CONSTRUCTION AND REPAIR.

METHOD EMPLOYED BY ITALIAN DREADNAUGHTS FOR QUICKLY IDENTIFYING DAMAGED COMPARTMENTS.

Source: Reliable.

19 March 1919.

(4282)

The hull is divided into watertight compartments by two longitudinal bulkheads, and by transverse bulkheads which are generally 7 to 9 meters apart. On the deck, on each side, directly above each transverse bulkhead, a broad, white line is painted, and alongside a number, the figures of which are 4 feet long and the lines about 4 inches thick. These lines and numbers are kept freshly painted in times of peace and of war. The idea is that in case the ship is struck by a mine or torpedo, the exact location can be instantly determined by a glance from the bridge, and appropriate orders given for flooding the opposite compartments to prevent capsizing.

INTERNATIONAL CONDITIONS.

CONDITIONS IN NORTHERN ITALY.

Source: Ensign Kimberly Stuart, U. S. N. R. F.

29 April 1919.

For the past eight months I have been stationed at Ravenna, Italy, in the province of Romagna, which is noted for being the worst socialist district in Italy. While there I had the opportunity of seeing expressions of Bolshevism such as propaganda posters and leaflets scattered throughout the city, and of seeing the garrison of this particular department increased from 3,000 to 10,000 men after the Armistice was signed.

It was in this district that the "Red Week Revolution" took place about six months before the war. This revolution was summarily suppressed after considerable damage. Since the abortive effort, the Socialist party has confined itself almost entirely to printed propaganda, strikes and obstructions.

The day of the Austro-Italian Armistice celebration I saw certain members of a crowd tear down the American Flag and heard a considerable portion of the audience cheering for Germany and Bolshevism. Nothing further occurred, as most of the offenders on this occasion were taken into custody by the Italian police. However, one of the military authorities (General Maraffini, Commander of the Division stationed in the city) told me confidentially that revolutionary activities of a more violent nature, viz., the destruction of property etc., were to be expected from day to day. This was about the middle of March.

So serious had conditions become that socialist meetings were watched with great care and all troops stationed there were forbidden the freedom of the city on days that socialist meetings were being held. Heavily armed patrols were constantly policing the city after dark and military maneuvers, presumably for the morale effect upon the civil population, were a constant occurrence.

Painted all through the city on the buildings were such signs as "Vive Lenine and Trotsky," which the civil authorities were unable to prevent, for as fast as they were painted out new ones would be painted.

A great deal of legally correct but destructive obstructionism was being carried on in almost every government department, railways, posts, etc. The idea of the socialists was by this obstruction to so

disgust the population with the inefficiency of the present government that any revolutionary attempt would be welcomed by the civil population. The military authorities with whom I talked, namely, the officers of the Division stationed at Ravenna, had very grave fears about this propaganda's effect on the army and it was due to these fears that the Army was not allowed leave when a socialistic demonstration was going on.

In Bologna the Mayor was a socialist and the day after the armistice made a public speech advocating strikes and encouraging the Bolsheviks to such an extent that he was imprisoned for some time because of these statements.

So grave was the danger of revolutions in the city of Bologna that when I was there two days after this speech I found the city practically under military rule, patrols with fixed bayonets in the streets and armed sentries at every corner. A large number of arrests had been made.

Several months later, and shortly before I left Italy, a very successful Bolshevik demonstration took place, that is, judging from numbers and the enthusiastic reception of this demonstration. This took place also at Bologna.

Military authority was unable to completely stop this demonstration; at least it was able to prevent anything further than speeches and a certain amount of wild talk. No property damage was done on this occasion.

In Genoa on the 30th of March, I was present at another socialist demonstration that had evaded the police restrictions and at first promised to be rather a serious affair. Prompt action on the part of the military authorities, however, who swept the streets with armed troops, prevented the demonstration from materializing.

Another demonstration, which was to be a much larger one, was to have taken place on the 7th of April, as I learned from confidential sources (an officer of the Italian Intelligence Department). Elaborate plans had been made by Italian military authorities for handling the situation in case it arose. The socialists, however, got wind of the military preparations and postponed their demonstration. From the appearance of such elaborate preparations as I saw, the authorities were expecting serious trouble, for machine guns and cavalry had been placed in detachments throughout the city.

Feeling Between Italians and Americans as Seen Prior to the Last Results of the Peace Conference but After the Armistice.

In Bologna in the same district of Italy, the American Red Cross turned over their Soup Kitchen, which had been running free of charge for the Italian soldiers at the railway station, together with

2000 lire and two months supplies (this to cover running expenses for one month), to the Italian Government. The Italian Government took charge at once and compelled the Italian troops visiting the kitchen to pay for whatever food they received. The result of this action by the Italian officials was the Italian soldiers felt that the war being over the Americans had no further interest in them. The general effect upon the men as a result of this was most regrettable and caused considerable hard feeling, as it was known by many that the Red Cross had left sufficient funds and supplies to continue this Soup Kitchen free of charge. In this way those who believed that they had been deserted by the Americans were disgusted, while those who knew of the funds and supplies left by the Red Cross broke forth in most violent expressions against the Italian government. Instances of this sort were very common and caused considerable bad feeling. This one particular case I actually know of. I heard of many others.

In Rome, and also in other parts of Italy, the Italian Y. M. C. A. was very much hampered by the rulings of the Italian authorities against distribution of supplies; this made its position for good very doubtful. In one particular case in Rome, the Italian Government would not permit the sale of such articles as tobacco to Italian troops, while other allied forces had the use of the Canteen supplies. As there were a great many Jugo-Slav troops in Rome who were given the freedom of the Canteens this tended to cause extreme friction between Italy and the above mentioned people, for which America was blamed. An individual instance of hard feeling which came to my personal notice was in overhearing the remarks of an Italian crowd who had gathered around an American officer in a dispute with his cabman to the effect that it was high time that these "American dogs" got out of Italy, that they had had too much of them already and that they had accomplished nothing for Italy, and the like.

This same sentiment of wanting to know how much longer the Americans were going to stay in Italy was expressed to me in the most insolent manner on innumerable occasions.

An instance where American laxity in granting passports did much to cause a great deal of damage was where a correspondent for *Harpers*, *McCalls*, and the *New York Call*, parading under the camouflage of the Red Cross, made a tour of Romagna, the worst socialist district in Italy, gathering every detail of the revolution from the most radical and rabid socialists. This was done with such openness that her actions were known by every one in the town and caused great indignation against the Americans that they should allow such a person to come to Italy and encourage by her interest in revolutionary matters a situation that was already most critical.

A report of a complaint presented to me from the prefecture of the province of Forli was turned in by me at the Consular office in Genoa for investigation.

The feeling between the French and Italians is very acute. Former Austrian officers are now passing themselves off as Jugo-Slav officers. German propaganda is widely circulated and apparently no steps are being taken to suppress it.

CONDITIONS IN ODESSA, RUSSIA.

Source: Reliable.

28 March 1919.

ECONOMIC SITUATION.

(The following cable on the economic situation in Odessa has been received at Paris.)

There is a severe shortage of manufactured goods of all kinds in the Odessa region because of the lack of raw material, formerly obtained from districts now held by Bolsheviks. Industries have come to a practical standstill. Forty thousand of the fifty thousand workmen formerly employed in the town are idle. Heating is a luxury, electric lights burn intermittently and no tramways are running. A survey of the markets shows apparent abundance of prime necessities selling at enormously enhanced prices. The authorities have been given to understand that until the stocks of food stuffs said to be hoarded by Russia are made available, or at least until a serious attempt to do this has been made, requests for food stuffs from America could not be supported.

The French are forming an Inter-Allied Commission to control exports and imports, to regulate the distribution and to combat speculation, which exists in practically all organizations. While a few persons make enormous profits the masses suffer, a combination which inevitably breeds Bolshevism. The population has been increased to nearly eight hundred thousand by refugees from Bolshevik Russia, and is thirty percent above normal. Single, unheated rooms without board rent for one thousand to two thousand and small apartments from five thousand to fifteen thousand roubles monthly. Congestion, lack of sanitary supplies and underfeeding are the underlying causes of the prevailing typhus epidemic.

FINANCIAL SITUATION.

There are in circulation notes issued by the defunct Hetman Government and the city of Odessa, Romanoff and Kerensky roubles being held for speculation. The currency situation is rendered more complex by the existence of counterfeit money and unauthorized

Ukrainian notes, the latter being estimated to exceed fifty million roubles. It is very necessary to examine each note carefully and often they are endorsed by the last holder. There is unlimited speculation in gold bullion with consequent violent fluctuations, which render it impossible to gauge the value of the cash on hand. The Imperial Bank notes sell at fifty percent for small amounts and one hundred percent for large, Kerensky's at a premium of twenty-five to forty and fifteen to twenty-five respectively. Money changers exact as much as nineteen percent for small change to a large extent. Banking has largely degenerated to speculation.

In *German territory* the franc varied from two and a half to five roubles in two days, while pound notes fluctuated from seventy-five to one hundred roubles. Francs are necessary for the essentials and for rental and are therefore in the greatest demand. It is evident that steps must be taken toward the stabilizing of currency, possibly along lines adopted at Athens. The scarcity of exportable goods in this importing district renders exchange of goods impossible except for large organizations having branches in the North Caucasus, where there are surplus supplies.

MILITARY AND POLITICAL SITUATION.

The military situation is unsatisfactory, although the French have apparently resolved to endeavor to hold Odessa. A large percentage of the laboring classes and the workmen sympathize with the Bolsheviki and if the city should be seriously threatened another catastrophe such as that at Kherson, where French and Greek garrisons were fired upon from the rear, would probably result. The Russian and French commands have not sufficient forces to undertake the imperative task of disarming the local population. The relations of the French and Russians have frequently been unfortunate and a number of democratic organizations have become estranged. The French commander-in-chief admitted that all classes of the population are dissatisfied. None of his staff has had experience in Russia and unfortunately the Chief of Staff, Friedenberg, is a Jew, and particularly successful in antagonizing Russian and even Allied elements. This is an inevitable result of military intervention and undirected and unaccompanied by experienced agency.

Here and elsewhere in Russia a great lack of efficiency and co-ordination among the Russians themselves emphasizes the need of tact and understanding on the part of outsiders. The French, therefore, are handicapped by having troops who are tired of fighting and whose morale is consequently far from good. The Greeks are poorly officered and are a doubtful element away from their native soil.

The bettering of the situation depends upon the arrival of sufficiently strong re-inforcements to assure safety in the rear and to make possible an extension of the zone of operations so as to include and securely hold the supply districts a short distance East or North.

CONDITIONS IN SIBERIA.

Source: Reliable.

26 March 1919.

(11239)

Practically every one in Vladivostok and Harbin knows but little of the true state of affairs in Western and Central Siberia. They are continually misled by false rumors and misstatements in the press. An attempt to explain the precise condition of affairs follows.

At present conditions are brighter than they have even been before. The railway is to be taken over by the Allies. The campaign of the Siberian army against the Bolsheviks is progressing favorably. "Kolchak Government" is stronger than ever before and its power is growing. This power is now practically absolute in Western and Central Siberia and while Kolchak is at least a good man he is not a strong one, but is a Russian patriot of the very best type. He is supported by the Zemstov[1] in Central and Western Siberia, and villages and cities are beginning to pay taxes regularly to the Omsk Government. Kolchak is not, as is generally supposed, surrounded by reactionarists and monarchists. In all civil matters his chief advisers are social revolutionists of the right. This is reassured by the fact that Vologodski is chairman of the Council of Minister, Michailof is Minister of Finance and Ustrokof is Minister of Ways and Communications. Other ministers with important portfolios are of the same political creed. It is only the treacherous Cossack Atamans,[2] now in Eastern Siberia, who have devised every possible difficulty by their intrigues and their treatment of the people and the Zemstov members.

When the Czechs forced their way through to Manchuria in June 1918, the Allies had the option of sending troops into Siberia or not at their discretion. Today they have no choice and no policy of independence can be followed. Kolchak is not asking today for foreign soldiers to assist him in his fight against the Bolsheviks. He can attend to that himself and is doing it successfully. He does, however, want clothes and munitions of war, and Siberia needs economic assistance, but what he needs above all things is protection in the

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[1] Zemstov signifies a commercial council of leading business men.
[2] Atamen signifies chief or headman, frequently called hetman.

rear against Semenoff, Iralgfy, Kalmikoff and outside intrigue. He can do nothing toward this of his own accord. He relies upon the Allies to do it. Japan must play fair with the Omsk and Allied Government. The disturbing influence of the Cossack Atamans who are murderers must be completely eliminated. This is the time for honest methods, plain talk, and firm decision. Russia is now in a fair way to master Bolshevism with her own resources, but success at this moment depends practically upon our decisive policy as adopted right here in Eastern Siberia.

MOHAMMEDANISM VERSUS BOLSHEVISM.

Source: Reliable.

26 March 1919.

(11239)

Sadrymaksondoff, president of the Council of Mohammedans in Russia, formerly member of the Russian Douma, has just called at the American Legation at Stockholm and made the following report.

There are in Russia and Siberia between 16 and 17 million Mohammedans. These Mohammedans are not Bolsheviks and could not be because of their national traditions and religious beliefs. They consider Bolshevism a social plague and unless checked a menace to the whole world. The Mohammedans of Russia and Siberia have fought the Bolsheviks for months and organized an army to protect the provinces they inhabit; the Bolsheviki, however, were supported by the Germans, were better equipped and compelled them to capitulate. Their strong army and organization were dissolved; and their chiefs and leaders persecuted and national capital confiscated. The Russians alone are not able to free themselves of this yoke; it can only be done by interallied forces forming the dispersed Russians into a new government, and for this purpose the Mohammedans could be counted on first and the majority of the Russian peasants are similarly reliable.

The change of life created by the Bolsheviki is incompatible with Mohammedan ideas. The Mohammedans have been enraged by the prohibition to teach in Tregar schools and secularization of marriage. Besides an army to fight the Bolsheviki, the allies should form a democratic government with political representatives of all influential parties in Russia and of all the numerous Russian nationalities. The provisional constitution and program of action of this government should be established by a commission with the assistance of representatives of the great powers. Everything must be avoided that could give rise to any doubt as to the real democratic form of the government thus established.

JAPANESE CONDITIONS.

Source: Reliable.

10 March 1919.

(7573 A.)

The Japanese military authorities have engaged the services of a number of French aviators as instructors for Japanese military aviators. According to latest information, the first party, consisting of 22 officers and 38 men, accompanied by Major Nakabayashi, of the Air Corps, who has gone to Shanghai to meet them, will arrive in Kobe by the N. Y. K. Yamashiro-Maru on 14th March. They will be in Tokyo for a short time and will then be billeted at Tokorozawa, Kagamigahara, and Toyohashi (aviation stations) to begin instructions in aviation. This instruction will continue for about three months. In the meantime it is expected that the second party of French aviators will arrive.

It is reported that both the naval and military authorities have been contemplating the selection of a port on the Japan Sea for the exclusive use of the Navy. For this purpose Tsuruga, Ohama, and Hongo, all not far from the Naval port of Maidzuru, have been mentioned, and the authorities have been making investigations in these places. As the result of these investigations the final choice has now been placed on Ohama, which has a deep and extensive harbor. It is said that if a large breakwater is built near Futakojima, an island off the port, it will make an ideal haven for warships. Moreover, Ohama has excellent means of communication with the mainland. The position will be further greatly improved when the railway between Tsuruga and Maidzuru is completed, which is expected to take place shortly, while it is also contemplated to construct a railway between Otsu and Ohama. In relation to Maidzuru, Ohama will be what Ujina is to the Naval port of Kure. (Ujina is a mobilization and embarkation point.)

A report says that the object of the French Aviation Mission is primarily to teach Japanese military aviators the art of dropping bombs and other war operations. Arrangements, however, have now been made whereby naval aviators will also be instructed by the French airmen. For this instruction twelve flight officers have been selected, and they will shortly leave the Naval Aerodrome at Oppama. It is expected that the site of the exercises will be in the neighborhood of Lake Hamana, near Toyohashi.

CURRENT ESTIMATE OF THE STRATEGIC SITUATION—GERMANY.

Source: Reliable.

April 1919.

TRANSPORTATION.

At the end of 1914, the German railway system included 61,749 km. of standard gauge track and 2,217 km. of narrow gauge; total 63,966 km. (about 38,380 miles). During the war the new construction was only on strategic lines. They increased the line between Berlin and Hanover from ten to seventeen tracks; from Berlin to Cassel, via Magdeburg, from eight to twelve tracks. They had begun work on a four-lined track from Antwerp to Hamburg, new lines from Stuttgart to Coburg and Giessen. The Germans took up lines not in military use in Belgium, France, Poland and other occupied territory to procure materials for new repairs and new tracks needed.

The lines used for military transportation were kept in fairly good repair considering the unusual wear and tear on the roads caused by war conditions. The machinery defects increased, though, due to lack of good lubricating oil and lack of material for repairs. Copper has been replaced in axlebearings, fire-boxes and boilers by inferior metals which do not have the strength and resistance of copper. Practically all brass and copper have been removed from locomotives and replaced by iron, which proves most unsatisfactory.

At the time of the armistice there was no lack of rolling stock, such as it was. During the war the best rolling stock was, of course, used for military transportation. The rest is in deplorable condition, due to lack of material and skilled labor, which has prevented adequate repairs. The car factories were able to fill only orders necessary for the prosecution of the war. The head office for railways placed orders for about 6,000 freight cars, which would have kept the car factories busy through the winter of 1918–19. The most serious handicap in the car building industry was the shortage of skilled labor.

All traveling and transporting of goods was cut down as much as possible. Troop transport service took precedence over other traffic but the number of these trains was being cut down all the time. Passenger trains were shorter in length and fewer in number, which made them unbearably crowded, even though the Government discouraged travel by greatly increasing the rates.

Several new railroad bridges have been built across the Rhine, including bridges at Duisberg, Wetburg, Hachfeld, Düsseldorf, Cologne, Remagen and Uumutz. Lighters were largely used to carry material for these bridges from Holland and Belgium.

According to the terms of the armistice, Germany had to deliver to the Allies 5,000 engines and 150,000 railroad cars before 16 Janu-

acy. She claims that this is absolutely impossible; so far she has given up 3,000 locomotives and 100,000 railway cars and states that this is all she can surrender.

However, figures published officially regarding the development of railway service in Germany show clearly that there are no grounds for Germany's claim. On January 1, 1916, Germany had in service 32,272 locomotives; on October 1, 1917, there were 34,500. If this increase has continued there should be some 36,000 in October 1918. The Minister of Trains declared April 22, 1918, in the Reichstag that during the war not less than 5,000 locomotives had been built, and another source shows that facilities in German factories had permitted the building of 4,000 locomotives annually. (An actual survey of the situation is necessary.)

The immense demand for transport facilities and the increasing deterioration of the railways and railway rolling stock emphasized the importance to Germany of canal development. During the war the traffic by waterways doubled. The rivers and canals were crowded with boats carrying coal, stone and cement, grain and garden truck. The North German Lloyd Line had a regular freight transportation service on the Rhine and the adjoining rivers and canals.

It was Germany's plan to spend three billion marks on the enlargement of the Central European canal system, to link up Northern Germany's river and canal systems with the Rhine and the Elbe, and also to connect the Danube with the Rhine, Oder and Elbe. The canal of the most immediate interest is from Strassburg to Basle, important for the sake of the water power and of making the Rhine navigable into Switzerland. The French are considering a rival canal from the Rhine into Switzerland, each trying to be the first to capture Swiss industry.

SHIPPING.

On January 1, 1914, the German merchant marine consisted of 4,935 sea-going ships of all classes, with a gross tonnage of 5,238,937. About two-thirds was lost at the beginning of the war, and 950,000 tons have been built since the war began.

As the expense of rebuilding the merchant marine would be enormous, many of the larger concerns greatly increased their capital. Many new companies were established; others combined into large corporations. Shipyards were being enlarged and new ones built. Many of the great munitions manufacturers were making arrangements to enter the ship-building field as never before in promoting these ventures. Among the schemes to encourage shipbuilding was the establishment of a ship mortgage bank for those who lacked sufficient capital. For ten years the sum of 300,000,000 marks was to

have been assigned yearly to the building up of the merchant fleet. Besides all these, Germany was negotiating for the hire or purchase of neutral ships for commerce after the war.

Germany is now practically stripped of her merchant marine through the provisions of the armistice and Allied terms for providing food. Germany will be dependent on foreign ships. It is reported from a reliable Norwegian source that she is now leasing vessels of neutrals.

COMMUNICATIONS.

Germany has a highly developed and very efficient system of telegraphic and telephonic communication. Owing to shortage of copper, many of the less important lines have been replaced with iron, zinc, and aluminum cables of larger diameter but these substitutes have proven unsatisfactory, as they frequently break under the action of wind and frost.

Direct telegraphic communication exists between Berlin and the other capitals of the Central Powers. A third direct telegraph line between Germany and Bucharest has been agreed upon. There is direct telegraphic communication between Berlin and the Ukraine, and press telegrams are now permitted between Germany and Finland sent via Swedish stations. Telephone service is to be established between Germany and Roumania.

As the cables connecting Germany with the outside world were cut at the beginning of the war, Germany has become almost wholly dependent upon wireless for contact with foreign ports and has done much to increase the power and capacity of her larger radio stations. The sending station is one of the most powerful in the world. It has been enlarged until it now has two principal towers each about 835 feet high and seven auxiliary towers about 490 feet high. Messages can be transmitted to a distance of 6,200 miles. Another station nearly as powerful is located at Eilvese near Hanover. At Neumunster, a junction half way between Kiel and Hamburg, there is a very powerful receiving station which can catch messages from all parts of the world. A powerful government installation at Berlin is in communication with Madrid. Other important stations are located at Tamdrup in Schleswig, Heligoland, Wilhelmshafen, Cuxhaven, Danzig, Norddeich, Sassnitz, Schwinemunde, Bulk, Breslau, Frankfurt, Coblenz, Karlsruhe, Gerolstein and elsewhere. The Germans are building a large and very powerful station at Grausse in Prussia.

STEEL GOODS, ETC.

The machine factories are active. Up to the middle of June, Germany had shipped 332 carloads of miscellaneous goods, of which 230 were agricultural implements. Further orders have been placed

for 600 more carloads of agricultural implements and 360 of divers goods. The German press claimed that at this time 30,000 tons of agricultural implements had been shipped to the Ukraine. During the summer exports of German machinery, especially agricultural implements, not only to Ukraine but to Poland and Lithuania, increased considerably. Germany also shipped tools to Swedish manufacturers. The industrial districts of Upper Silesia, particularly those manufacturing machines, showed great activity in early summer. Building of rails, other railroad materials and bridge materials is active. Section steel and girders can only be supplied for military purposes. The wire trade is brisk, for though the Army orders for barbed wire are less, it calls for large calibre wire for shrapnel; also the call for wire to replace copper wires in telephone and telegraph installations and in electric tramways has increased.

ORDNANCE

DEFENSIVE ORGANIZATION OF THE BELGIAN COAST.

Source: Army Ordnance Department.

January 1919.

On April 28, 1915, 380 mm. shells, fired from a distance of about 39 kilometers by a German gun installed near Clerken, fell in Dunkirk. This was the first bombardment at such a long range. Its moral effect should be added to the surprise produced a few days previously in the same sector, by the appearance of the first layers of asphyxiating gas. In order to be ready at the appointed time, the installation at Clerken was accomplished hastily, and consequently was very vulnerable; our counter-battery easily proved this to be the case. This miscalculation decided the enemy to renew his efforts with greater precautions.

Another gun of the same caliber was mounted at the Leugenboom position (about 2 kilometers east of the Belgian village, Moere). The platform, the shelters, the tracks, and the camouflage, represent, according to the inhabitants of the country, the labor of 200 workers, who were employed upon it during eighteen consecutive months. The Leugenboom gun went into action in May 1917, and continued to fire on Dunkirk, in defiance of the well-aimed return fire of our artillery, until the retreat of the German armies.

Following is a brief description of these installations:

THE LEUGENBOOM GUN (38 cm. S. K. L/45. i. Kst. P. L.).

The Leugenboom position, known to the Germans as the "Pommern Battery," which went into action in May 1917 by firing on Dunkirk, is located about 10 km. to the N. W. of Thourout, and 1 km. west of the Thourout-Ostend line, in a small wood near the village of Moere. A branch from the standard gauge track leaves the Ostende-Thourout line and leads to this position.

The work began at the armed position; a track was then built, branching from the main track, and leading to a false position situated in the same wood, but about 400 m. further to the north. At the same time, the track leading to the first position was carefully camouflaged with earth and grass. This camouflage, however, was useless. For one thing it was too long delayed, and for another, the true position remained entirely visible with almost all its details of organization.

Position.

The position consists of:—

1. A platform of reinforced concrete for a 38 cm. S. K. gun L/45 on an armored carriage.
2. Two lateral concrete shelters.
3. One detached shelter, 100 m. to the N. N. W.
4. One false emplacement, 400 m. to the N. N. W.

Platform.

The semi-circular platform of concrete is of exactly the same type as that already encountered at Coucy-le-Chateau.

It consists of a circular excavation, 3.60 m. in depth, intersected towards the front by two vertical walls which form an angle of about 140°.

The base of the pivot of the carriage is embedded at the center of this pit; around the sides are steps. The upper step, 1 m. in depth and 1.80 m. in width, is covered with a wide, circular, cast-iron plate, 4 cm. thick, which serves as a track for the rollers of the carriage.

In front of the platform there is a circular concrete barbette 1.55 m. in height.

Between the last step and the base of the pivot, there is a circular depression, 1.10 m. deep, which, under normal conditions, is covered over with boarding.

It serves to collect rain water which is carried off at the front by a drain.

In the forepart of the pit, there is a subterranean chamber containing an electric motor, and communicating with the bottom of the pit by two doors in the front vertical walls. This motor supplies the motive force necessary for operating the gun.

The Gun.

The gun is a 38-cm. rapid-fire naval gun of 45 calibers, (S. K. L/45 Mle 15), identical with that at Chuignolles.

The Carriage, with pivot in front and rollers at the rear, is also identical with that at Chuignolles.

The gun, with a cradle having two brakes and a recuperator, is mounted by the two trunnions of the cradle on a carriage formed of two long horizontal metal beams strongly braced and resting:

In front, on a strong metal pivot, with bearings, 15 cm. in diameter;

In the rear, on two rollers, 1 m. in diameter, moving on the circular metal plate of the pit.

Length of recoil: 1.25 m.

The Leugenboom gun is completely armored with steel plates 63 mm. in thickness. These plates are mounted laterally on transverse metal plates supporting the platforms and maneuvering

winches; at the upper part of the gun, they rest on a metal frame supported by standards formed of two U irons and set up on the two brackets of the carriage.

The gun is operated in the same manner as the Chuignolles gun, either by hand or by means of two electric motors which actuate:—

(1) *For Aiming for Direction*, a pinion engaging with traversing rack of the circular plate of the cylinder;

(2) *For Aiming for Elevation*, a powerful screwbolt secured by two trunnions underneath the carriage, and by a strong key between two lugs under the cradle.

Aiming for elevation is accomplished by means of a graduated circle placed to the right of the carriage.

Aiming for direction is accomplished by means of telescopic sights placed to the left of the carriage.

Amplitude of aim for direction, 157° 4/16.

Amplitude of aim for elevation, 55°.

Weight of tube, 77,500 kg.

Weight of cradle, 27,300 kg.

Weight of entire carriage (without armor plate), 218,500 kg.

Ammunition.

The ammunition found in the shelters corresponds to the three explosive shells already known.

As charges for the 38-cm. S.K.L./45 there were found:—

(*a*) 2 loaded cartridge cases, one containing 87 kg. of RPc/12, the other 60 kg. of RPc/12 (Hulsen-kartusche [1]);

(*b*) 3 bag cartridges, one containing 60 kg. of RPc/12[2], another 96 kg. of RPc/12, and the third 118 kg. of the same powder (Vorkartusche[1]).

The three gun charges are as follows:—

Reduced charge, 120 kg. (H. K.[3] 60 kg. and V. K.[3] 60 kg.).

Full Charges: 183 kg. (H. K. 87 kg. and V. K. 96 kg.); 205 kg. (H. K. 87 kg. and V. K. 118 kg.).

Shell.	Weights.	Ranges.		
		Reduced charge 120 kg.	Full charge 183 kg.	Full charge 205 kg.
Explosive shell, L/4.1	750 kg.	25,300 m.	34,200 m.	
Explosive shell, L/5.4	743 kg.	28,700 m.	38,700 m.	
Light explosive shell, L/4.1, with false head.	400 kg.			47,500 m.
Shrapnel shell, L/3.6 or L/3.4[4]	750 kg.	22,600 m.		

[1] Translator's Note.—*Hulsenkartusche* is a cartridge for use in rapid-fire guns which have no fixed ammunition; the cartridge is contained in a metal case which also carries the priming screw. *Vorkartusche* means simply front cartridge.

[2] One of the cartridge bags bore a label corrected by hand so as to read: 60 kg. R. P. c/06.

[3] The abbreviations H. K. and V. K. stand for Hulsenkartusche and Vorkartusche, respectively.

[4] No shrapnel shells were found.

All the shells are fitted with the Bdz. f. Spgr. m. k.[1] base fuse.

Initial Velocity: 800 M.

A German document (Plain chart of the Belgian coast defenses) reported by the Belgian Grand Headquarters, furnishes complete information concerning projectiles and ranges. It mentions, in connection with the Leugenboom gun, a light explosive shell with a large false head, 4.4 caliber, known as L. Spgr. L/4.4, the range of which is 55,000 meters.

This projectile is not mentioned in any of the works known to us which have been written on high power heavy artillery.

Shelters.

Two concrete shelters are located, one to the left of the platform, the other to the right; their entrance is turned to the rear and is staggered.

The left-hand shelter, 12 m. in width by 10 m. in depth, is divided into three rooms and two corridors.

The two rooms to the left are cartridge rooms. A narrow track (0.60 m.) runs through the inner corridor and serves the cartridge rooms. The right-hand room contained hydrogen cylinders.

The right-hand shelter, larger than the other, is about 12 m. in width and 19 m. in depth. It is divided into two long rooms; the first, opening on to the platform by a door on the same level, is intended for the personnel; the second is the store-room for projectiles. An I-iron is attached to the center of the ceiling and crosses the inner corridor. This rail serves as support and track for a rolling tackle; it is used in the hoisting and transportation of the projectiles, either at the unloading of the 0.60 m. cars when they bring supplies, or in loading the small 3-wheeled trucks which serve the guns.

A 0.60 m. track leads, through a door situated on the right side of the shelter, into the corridor leading to the shell room and the personnel room.

The whole interior is lighted by electricity, as is the gun also.

Behind the position, and between the shelters, is a long splinter-proof shield of sod, supported by hurdles or boards with staggered passages at both ends.

Railways.

The tracks, which are very much camouflaged, lead to the rear of the splinter shield. The service tracks, intended for the mounting of the platform, have been dismounted.

A branch line led from this track to the south of the small wood and was used for the transportation of ammunition.

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[1] Bodengunder für Sprenggranaten m. k.—Base fuse for explosive shell of medium caliber.

When the false position was constructed, this track seems to have been dismounted, and at the same time the principal track was covered with earth. A 0.60 m. track was then laid on the edge of the wood, starting from the right-hand shelter and running to the false position.

From this time on, the supplies seem to have been stored at the false position, and carried from there to the true position by means of the 0.60 m. track.

This shelter, which is divided into two rooms and one cement shed (at the rear of the shelter) was intended for the personnel. The shed contained an electric plant of 4.2 Kw. (1200 revolutions—70 volts—60 amperes) used for lighting.

False Position.

The false position, which, however, could be detected in a good photograph, consists of a circular space, its diameter the same as that of the true platform, on made ground, and crossed at the center by the track. To the right and to the left, there is a structure lightly built of boards in imitation of a shelter.

We found at this spot two cylindrical metal tubes, closed at the lower end and mounted like small howitzers, on a light metal carriage. These tubes were pierced at the lower end by a small priming hole. They seem to have been intended to produce smoke, in imitation of a false discharge.

Rows of smoke generating devices in large numbers (Nebeltrommel) were arranged to the East and North of the position.

Of the counter-fire directed against the position, the shell coming the nearest fell 60 m. to the rear of the true position; the others were scattered along the edge of the wood, between the two positions.

Numerical Data.

3.8 cm. S. K. L/45.

Length	45 calibers (17.10m.).
Number of grooves	100
Width of lands	6 mm.
Depth	3 mm.
2 brakes and one recuperator	
Length of recoil	1.25 m.
Weight of tube	77,500 kg.
Weight of entire carriage (without armor)	218,500 kg.
Weight of cradle	27,300 kg.

DEFENSIVE ORGANIZATION OF THE BELGIAN COAST.

A large number of batteries of all calibers were established between Middlekerke and the Dutch frontier.

Their characteristics are given briefly below, in accordance with the report made by the General Headquarters of the Belgian Army.

OSTEND DISTRICT.

"AACHEN" BATTERY; four 15 cm. S. K. guns L/40.

Wedge fermature.

The carriage is placed in an armored turret.

It is composed of two brackets with jacket.

There are two recoil brakes in the axle and 4 recuperators, 2 on the left and 2 on the right.

Simple bar sight with sighting-piece and front sight.

Length of the sight-line about 0.60 m.

"NEU ANTWERPEN" BATTERY; four 17 cm. guns L/40.

The carriage is equipped with brakes; the recuperator is underneath.

Sight with 2 graduations on the front face.

There is a special compensator, with graduations to $-+40$ and -40.

The head of the sight possesses a slide indicating 40 to the right and 60 to the left, with alidade and support for the telescopic sight.

The aiming circle for direction is graduated in degrees.

"BESELER" BATTERY; four 15 cm. S. K. guns.

The destruction was so great that all the material, all shelters and storehouses are buried under the sand.

"CECELIE" BATTERY; four 15 cm. S. K. guns.

Material identical with that of the "Kaiserin" battery at Blankenberg. (Described later.)

"TIRPITZ" BATTERY; four 28 cm. S. K. guns.

Made by Krupp in 1911.

Gun with wedge fermeture.

Carriage with central pivot, composed of a base with two metal girders, which receives, by means of special bearings, the trunnions of a cast-steel jacket. The latter supports 2 brakes on the vertical axis; and 4 recuperators, two of which are below and two above. The brake rods are attached to the breech hoop by clamps. The recuperator rods are also attached to this hoop.

Aiming for Direction is accomplished by means of a winch operating the rear recoil rollers of the carriage by a train of gears. A circle in degrees and thousandths, is placed on the rear wall of the pit.

Aiming for Elevation is accomplished by means of two toothed sectors engaging with an elevating shaft with double pinion, which is set in motion by an arrangement of pinions and sprocket chain operated by a fly wheel placed to the right of the carriage.

To the left, there is a standard which holds a goniometer and a telescopic sight support.

At the rear, on the right, is a graduated device on a support, which has the form of a scale with index.

This is probably the electric discharge.

"FRIEDRICH EYLAU SCHLEUSE" BATTERY; four 8.8 cm. guns.

Same arrangement as the 10.5 cm. guns of the "Mittel" battery at Blankenberg (described later).

"HINDENBURG" BATTERY; four 28 cm. guns.

The *gun*, with wedge fermeture, is an old model.

The lower carriage is composed of two brackets supported at the rear by recoil rollers; in front there is a pivot. The gun turns in a gun slide which runs on an inclined chassis.

Aiming for elevation is accomplished by the action of a pinion and rack at the right. Near the elevation fly-wheel there is a graduated sector, along which moves an index, and which is placed on the trunnion of the gun. The sector has four graduations, one of the 0° to −5°, and to +17°. The three others are 0 to 7 km.; 0 to 7.5 km. and 0 to 5.5 km. Vo=455 m.

On the left is an auxiliary sight identical with that on the right.

This gun is equipped with a loading-platform.

Aiming for direction is controlled at the rear by a vertical pinion engaging with a sprocket chain.

The recoil brake is at the lower part and is connected with the gun-slide carriage.

There is a loading tackle on the right side.

"IRENE" BATTERY; three 15 cm. guns L/35.

Old model gun with hoops to the end.

The *carriage*, also old, has a central pivot supporting a chassis on which moves a gun-slide with keys to prevent lifting up.

There are recoil brakes to the left and right opposite the brackets and connected with a recoil gun-slide. The rods are attached to the transom of the chassis.

The left-hand sight is mounted on a sector.

A compensation indicator moves along the sight, and a fixed index. At the side is a device (old type) with straight sight, slide and alidade, which gives a sight-line of about 1 meter. The three guns are out of service.

"DEUTSCHLAND" BATTERY; four 380 mm. guns.

Except for some slight difference in the arrangement of the aiming mechanism and in the armor of the carriage, these guns are identical with the Leugenboom gun.

BLANKENBURG DISTRICT.

"BERTHA" BATTERY; four 21 cm. guns L/40.

Krupp gun, 1898, with wedge and translating screw device.

The material is identical with that of the "Freya" battery, at Heyst. (Described later.)

"HAFEN" BATTERY; four 8.8 cm. guns L/30.

Gun with wedge with old type closing cap screw.

Fork-pivot carriage with pedestal bolted to a plate.

The chassis has ball-bearings and a central pivot.

On the upper part, there are two inclined recoil slides for recuperation. The gun-slide, consisting of 2 brackets and bearing the gun trunnions, moves on these. Each one of these brackets has a cylinder recoil brake. The rods are attached to the forward transom of the chassis.

The entire vertical aiming system recoils with the gun-slide.

The sight is introduced into the breech and is straight, as in the old type 1889, 12-c. guns.

A shield, 12 mm. thick, is attached in front.

"KAISERIN" BATTERY; four 15 cm. S. K. guns.

Gun.—Manufactured by Krupp, 1900. Weight: 4681 kg. Length: 6 m. Tube hooped as far as the muzzle. Wedge fermeture, with translating screw.

Carriage.—Pillar-mount with central pivot supporting a chassis composed of two side rails which serve to guide the gun in recoiling. At the center of the chassis, there is a jacket, having on the right and on the left cylindrical bearings which receive the recoil brakes. The brake piston rods are at the front of the chassis.

The gun in recoiling probably compresses the recuperator springs, which are in the boxes behind the recoil cylinders and in the same axis as these. The mean recoil is about 300 mm.

Aiming for elevation is accomplished by means of a rod with double pinions engaging with two toothed sectors. The controlling gear consists of a worm and wheel.

Aiming for direction is accomplished by means of a spiral-gear wheel which actuates a traversing rack attached to the fork-pivot mount.

The carriage is protected by circular horizontal armor, 25 mm. thick, with a shutter embrasure 70 mm. thick.

The *sighting apparatus*, attached to the left of the carriage, consists of a box, containing the sight graduated in degrees and 1/16 degrees, from −4° to +30°, and 3 range scales for different charges.

The head of the sight bears a scale from 0 to 64 thousandths, and should be equipped with a sight hole and telescopic sight.

"MITTEL" BATTERY; four 10.5 cm. S. K. guns.

Gun—Krupp, 1911; length: 45 calibers. Wedge fermeture and translating screw.

Carriage—Fork-pivot mount with central pivot; jacket, with fork and cast-steel trunnion, in which the gun slides and which probably receives the lower brake and the two left and right recuperators. The gun has a clamp for the brake rod and two clamps with cross bar, fastening the rods of what were probably spring recuperators.

Vertical aiming is accomplished by means of two devices, one on the left and one on the right, each consisting of a rod and wheel engaging a sector and controlled by a worm gear.

Aiming for direction is also accomplished by two devices, one on the left and one on the right, consisting of a spiral gear wheel which sets in motion a traversing rack.

The carriage is protected with armor 25 mm. in thickness, with shutter embrasure.

The *sighting devices* are to the left and right of the carriage; and consist of a sight box, attached to the jacket, in which slides a sight marked with a scale in degrees and 1/16 degrees, from 0 to 30 degrees, and four graduations for range.

On the left of the sight head, is a scale of 70 mm. and on the right one of 50 mm.

To the right is a telescopic sight. The sight line is about 900 mm. in length.

"GRODEN" BATTERY; four 28 cm. "Howitzer" guns.

It has been impossible to study these guns in detail, as they have been completely demolished. A fairly large quantity of projectiles still exists.

ZEEBRUGGE DISTRICT.

"WURTEMBURG" BATTERY; three 10.5 cm. S. K. guns L/40.

These guns are identical with those at Blankensberg.

The *carriage*, with central pivot, supports a jacket with trunnion resting in grooves in the brackets. The recoil brake is situated in the axis of the gun, and above the jacket in which it is secured, while the rod recoils with the gun.

There are two recuperators, one on the right, and one on the left, on top of the gun.

The recuperators (cylinders) slide in the jacket and compress the springs of rectangular section of 25 mm. X 10 mm. The oscillating body rotates at the rear end of the carriage, which necessitates a spring counter-poise.

Armament of the Mole.

This consists of:—

(a) 2–15 cm. S. K. guns.

(b) 4–8.8 cm. guns, two of which are of the same type as the guns of the "Kanal" battery, described later on, and two of the same type as those of the "Lekkerbek" battery, a description of which will also be found later.

"FRIEDRICHSORT" BATTERY; four 17 cm. S. K. guns L/40.

These guns have been so nearly destroyed that it is impossible to give an exact description of them.

Brakes.—Two recoil brakes placed in the vertical plane of symmetry of the gun. The cylinders are lodged in the trunnion jacket in which the gun slides. The rods are fastened to two breechlocks. There are four recuperators, two on each side of the recoil brakes. The recuperators have double springs, the wires of which are 22 mm. and 15 mm. in diameter.

Sighting Instruments.—There are two goniometers for aiming for direction, independent of one another. The one at the rear possesses an axis which serves as pivot for a circular slide whose angular course is measured by the goniometer. This entire assemblage is able to pivot about an horizontal axis by means of an endless screw and a screw-wheel sector. On cylinder concentric to the screw, there is a graduated band wound spirally, along which a slide travels. The second device is connected with a rod which communicates the motion to an index traveling along a sector situated within reach of the vertical gun layer.

The forward gunner also has available a goniometer.

On this instrument is a bracket probably intended for a telescopic sight.

HEYST DISTRICT.

"KANAL" BATTERY; four 8.8 cm. guns L/35.

Wedge fermeture with translating screw.

Krupp carriage with central pivot on a pillar support and metal platform.

The carriage receives the trunnions of a cast-steel jacket, which supports the two recuperator cylinders and the attachment of the brake rod. The latter is secured to the breech of the gun. Left and right of the cylinder brake two rods with crosshead are attached,

which compress the recoil springs. The recoil measures about 180 mm.

The aiming devices for direction and elevation are of the same type as those on the 8.8 cm. guns mentioned previously. Sight at the left-hand with scales: 8.8 km., 8.9 km., 9 km., and 9.1 km. Vo=770 m. Weight of projectile 7 kg.

"FREYA" BATTERY; four 21 cm. S. K. guns L/40.

The general construction of the carriage is the same as that of the 30.5 cm. guns of the "Kaiser Wilhelm II" battery, described later.

A sight is fastened to the right-hand trunnion by a connecting rod and is marked with 4 range scales, two for 16 km., one for 16.2 km., and one for 16.3 km.

There is also a circular shield.

"AUGUSTA" BATTERY; three 15 cm. S. K. guns.

Central pivot carriage, with gunslide moving on the carriage which has an inclination of several degrees, as far as it is possible to judge from a superficial examination, and taking into account the condition of the material.

KNOCKE DISTRICT.

"HAMBURG" BATTERY; four 10.5 cm. S. K. guns.[1]

Gun.—Krupp manufacture of 1890. Wedge fermeture with plate and obturator ring and discharged by means of a friction primer.

Carriage.—Central pivot carriage, with gun slide having in front two recoil rollers on a circular track, and two at the rear on a metal plate. The recoil-checking cylinder is attached to the forepart of the chassis by two trunnions. The gun is connected with the gun-slide by trunnions resting in grooves. The gun-slide moves, by means of four rollers, on an inclined plane of the chassis, to right and left.

Two hooks placed in front prevent lifting out.

Recuperation is accomplished through the weight of the gun.

Aiming for direction.—A screw in the chassis engages with a screw wheel on the pedestal.

Aiming for elevation.—Is accomplished by means of a screw wheel with pinions engaging with serrated sectors. At the side there is an auxiliary gear for rapid elevation.

The sighting apparatus consists of a sector graduated from 0 to 25° and is attached to the left-hand side.

"KAISER WILHELM II" BATTERY; four 30.5 cm. S. K. guns (50 calibers).

Gun.—As far as can be judged, in the present condition of the material, these guns consist of 4 jackets and one tube. The 4th breech

[1] The same as those of the "Mittel" battery at Blankenberg.

sleeve is attached to the 3rd by a bayonet hoop which appeared after bursting.

Carriage.—The carriage is composed of 2 girders forming bracket-transoms in front and in the rear. There is a cast-steel jacket carrying two trunnions, in which the gun slides. The breech carries a clamp which is attached at the center to the recuperator cylinder, and, to left and right, to the brake rods.

It was not possible to examine the mechanism of the recoil-checking cylinders and the breech.

Sighting Device.—On both sides there are aiming telescopes. For aiming in direction, a graduated circle is fixed in the wall of the pit.

BATTERY AT LEKKERBEK; two 8.8 cm. S. K. guns.

Old type material, completely disabled.

Carriage with central pivot and ball bearings.

Recoil brakes to the right and left in the brackets of a gun-slide, which carries the trunnion beds of the gun, and which moves on an inclined plane formed by the chassis.

Aiming for direction by spiral-gear wheel with endless screw.

Aiming for elevation to the left with traversing rack attached to the breech.

"BREMEN" BATTERY; four 15 cm. S. K. guns.

Impossible to inspect this battery, such was the collection of artillery by which the Germans showed their intention of occupying the territory permanently, at the same time gratifying their taste for the gigantic. At the time when they were obliged to evacuate Belgium, fresh improvements were being planned, if one may judge by the accumulation of concrete materials, and by the molds ready to receive the concrete. Today nothing remains of all this but ruins.

DESIGN OF PROJECTILES—ITALIAN NAVY.

Source: Reliable.

February 11, 1919.

(5693)

No evidence was found of any considerable Italian experimental work on the design of ammunition, but the Italians are adopting the French results and are proceeding to design and construct a whole new series of projectiles. These projectiles all have long ogives, stream line bases and, in the case of the larger calibers, wind shields.

The Italian Officer in charge of the design of shell for the Navy, Lieut. Commander Silvio Salza of the Commissione Permante per

gli Esperiemento del Materiale di Guerra, seems to expect increased range from the stream line base at high muzzle velocities as well as at low ones.

Lieut. Commander Salza did not, however, seem to have any very extensive theory on the design of shells. The only experiments which he used were actual firings. He had it clearly fixed in his mind that false caps and stream line bases were very desirable from the point of view of range. He thought that the effect of a false cap was due to increasing the moment of inertia about the axis of the shell.

The Italian Navy seems to be using a considerable number of shells with false caps and without great armor piercing power. They consider that there is a great deal of use for such shells against the lighter types of boats and they consider that they have obtained good results from these projectiles in actual practice.

Drawings were seen of a light weight shell for the 381 mm. 40 caliber gun with a false cap, with a nearly conical ogive and a meplat. The shell itself has two compartments for the explosive and an armor piercing head. The charges are held in their exact places by pieces of wood.

False caps have been found to give from 20 to 25 per cent increase in range in the Italian 150 mm. naval shell.

The so-called monobloc projectile for the 305 mm. howitzer, which has a long ogive and a long boat-tailed base, the boat-tailing being about six inches, was said at Cirie to have given a range of 3 kilometers more than the other projectiles used in this gun and a muzzle velocity of 450 meters per second. The range was about 14,000 meters. The shell is called monobloc because it is made in a single piece. On this account it is necessary to cast the explosive charge in the shell instead of loading it in the usual Italian way.

The rotating bands as used in the Italian Navy seem to be very similar to those used in the British Navy, but double rotating bands similar to the French ones are also used. The position of the rotating bands is considered as important. Moving the band backward toward the base of the shell was thought to have improved the dispersion in some cases. In testing ammunition, the engraving of the rotating bands is carefully inspected.

At Nattuno, the Italians are working on a design of a new projectile with stream line base, long ogive and a small false cap which in preliminary trials has given 20 per cent more range than the old types of projectiles. This projectile has a double wall, being grooved in squares so as to give uniform fragmentation. The explosive charge is in a paper cylinder, as in other Italian projectiles. The charge is calculated to be large enough to secure the burst of the shell and the inner wall increases the amount of available fragmenta-

tion. The fuse is of a French type with a long spiral powder train and a small aluminum cap.

One of the striking features of the design of Italian projectiles as seen at the loading plant at San Bartolomenio is the fact that the various parts can all be made separately and all assembled at once; in particular, the explosive charge is made up in the form of a paper enclosed cartridge. The TNT is pressed together and not cast.

The Italian method of loading shells makes possible great precision in the balance of the shell because the charge is held in its exact position by felt washers and blocks of wood. It also makes it possible to keep the weights of the shell very uniform. The Italian Navy is going in extensively for false caps on their projectiles.

A wooden wind shield has been developed for use in connection with anti-submarine projectiles. These projectiles have either a square or a slightly concave head in order to secure penetration into water without ricochet at small angles of impact. Such a projectile, of course, has a very bad ballistic co-efficient while it is going through the air. To obviate this, a wooden false cap of a specially prepared fiberless wood was provided which is entirely destroyed when it strikes the water. This is said to have worked successfully so that the shell had both good flight in the air and good penetration into water. The shell was of 65 mm. caliber. This sort of a false cap may well turn out to be useful in other connections.

It was stated that some rifled projectiles of the Charbonnier type are being manufactured for experimental purposes.

In connection with the problems of strength of material involved in the design of projectiles, there is a book by Colonnetti entitled "Sulla Fabricazzione dei Projetti."

GUNS ON SHIPS OF THE *DUIL 10* CLASS—ITALIAN NAVY.

Source: Reliable.

19 March 1919.

(11525)

There are 13 guns of 305 mm. calibre, built by the Italian Armstrong Works, 46 calibres long; 16 guns of 152 mm. built by Ansaldo, with the Schneider breech mechanism, 45 calibres long. The 305 guns are in 5 turrets, No. 1 carrying 3 guns, being on the forecastle; No. 2, carrying 2 guns, directly behind No. 1, and firing over it; No. 3, in the middle of the ship, carrying 3 guns, is on the main deck; No. 5, also on the main deck, also carries 3 guns; No. 4 is directly ahead of No. 5 and carries 2 guns, shooting over No. 5.

Of the secondary battery, 4 forward guns (on the main deck) can be trained from directly ahead to 30 degrees abaft the beam. The

8 guns near the middle of the ship (on the gun deck) can be trained from 60 degrees ahead to 60 degrees abaft the beam; the 4 guns near the stern (also on the gun deck) from directly astern to 30 degrees ahead of the beam. All but the 4 forward guns gave the writer the impression of being about the same height above the water line as the 7-inch guns on the U. S. S. *Minnesota.* When attention was called to this, the officers admitted that they were rather low. (It is to be remembered that these ships are designed for use in the Adriatic and Mediterranean.)

The 305 mm. guns have a maximum elevation of 20 degrees, depression 5 degrees; maximum muzzle velocity 840 or 850 meters per second. Muzzle velocity with reduced charge (used in this test), 650 meters per second—approximately.

The clear inside width of the three-gun turret between parallel sides is 8.4 meters. Each gun has its own trunnions and can be elevated and depressed independently. The trunnions are much longer than on the American 12-inch guns and the trunnions of all the guns have a common axis. There is, therefore, ample room for partitions between the guns, but there are no such partitions installed. The trunnions are attached by heady brackets to a cradle under the gun, there being no sliding sleeve around the gun, as in American practice. The turrets are more roomy and easier to get around in than in the American ships of the *Pennsylvania* class, although it will be seen from the inside width, stated above, that the turret is very little larger (compare 25 feet 11 inches, the turret track diameter on the *Pennsylvania*).

Breech operation and loading are wholly by power (former, hydraulic; latter, electric). Nevertheless, each loading took about 65 seconds from movement of firing until ready to fire again—including about 12 seconds of time of going back into battery. This compares with the 20 and 25 seconds (exclusive of time of going back into battery) which the writer observed with hand operation of breech and loading on the U. S. S. *Missouri.* Of the 3 bags of powder per charge, one was carried on the floor of the turret, 2 coming up in the loading machine, but the writer was told that in action, with full charges, all 4 came in the loading machine on the same trip with the shell and none were carried in the turret.

The total number of enlisted men and petty officers in a three-gun turret during fire was 20. There were also 3 commissioned officers, of whom two seemed to be there simply to observe and help with the test of the new fire control system.

CHARACTERISTICS OF ANTI-AIRCRAFT GUNS ON DREADNAUGHTS OF *DUILIO* AND *CESARE* TYPE—ITALIAN NAVY.

Source: Reliable.

24 March 1919.

(11509)

The following are the principal characteristices of the anti-aircraft guns on the two latest types of Italian dreadnaughts, namely, the *Duilio* and *Cesare* types:

	CESARE type.	*DUILIO type.*
Calibre	76/40 [1]	76/45 [2]
Weight of gun with breech mechanism complete	660 Kg	710 Kg.
Height of mount from the ground to the axis	1,380 m/m	1,690 m/m
Diameter of the base of the carriage	711 m/m	930 m/m
Space essential for gun-crew	2,500 m/m	2,400 m/m
Force of recoil	12,192 Kg	16,150 Kg.
Compression	25,630 Kg	18,100 Kg.
Firing strain exerted upon firing between mount and deck	23,780 Kg	27,100 Kg.
Angle of elevation	75°	80°
Angle of depression	10°	5°
Maximum vertical ordinate of trajectory	6,640 m	6,957 m.
Total weight of gun and mount	1,898 Kg	2,210 Kg.

[1] of the Armstrong Pozzuoli type, 6 guns to each ship.
[2] of the Ansaldo type, 6 guns to each ship.

Anti-aircraft guns are placed on platform carriages.

SUBMARINES.

CRUISES OF GERMAN SUBMARINES ALLOTTED TO UNITED STATES.

Source: Force Commander in European Waters.

15 April 1919.

(10352 Q)

U-140.

U–140 is a cruiser submarine and carries 2 guns.

She was commanded by Korvettenkapitan Kophamel, who was originally in one of the *Deutschland* submarines and is a man of about 37 years of age. He possesses many orders, among which is the Iron Cross, and has been in the service since 1898.

The submarine probably had her trials in April 1918 and left Germany on her first cruise at the end of June for the coast of America.

Proceeding out north of the Shetland Islands she probably had her baptism of fire on the 10th of July when she was fired at by U. S. S. *Kanawanha* in the Atlantic. She does not appear to have been injured in any way and proceeded west, stopping a Danish steamer on the 19th but allowing her to proceed unharmed.

Still making west, she chased and shelled 2 British steamers on the 26th, and on the 27th sank a Portugese sailing vessel with a cargo consisting of turkeys and live hogs, which she removed and placed on board.

She then appears to have chased a steamer on the 30th and again owing probably to her slow speed was unable to inflict any damage.

Nearing the coast of New Jersey she sank an American oiler by gunfire on the 4th August off Chesapeake Bay.

On the 5th in a position further south she appears to have sunk an American steamer by the usual method of halting the vessel by gunfire and, after her crew had taken to the boats, sinking her with bombs.

She then probably made towards the coast and on the 6th shelled an American steamer and sank the Diamond Shoal Light Vessel.

After cruising in the vicinity of Cape Hatteras she turned East in preparation for her homeward journey and on the 13th shelled a steamer, which escaped.

Turning north she sank a British steamer by gunfire, 180 miles from Cape Sable, Nova Scotia.

From that date she turned eastward, making direct for Germany. She appears to have had some slight leakage on her way over, as on the 9th she delayed her passage awaiting a submarine which came to her assistance later in the day. They then proceeded in company to Germany, passing the Skaw and Albach Bay, arriving about the 20th September.

During the cruise, *U–140* sank 9 vessels aggregating a tonnage of 29,966 tons.

She was inspected by the Allied Commission on the 14th December at Kiel and on the 20th February left Germany for Harwich, where she surrendered on the 23rd February.

U-117.

U–117 is a large minelaying submarine about 250 feet in length and carries two guns. She was commanded by Kapitan-leutnant Droschen, who was previously in *U–87*, and probably had her trials about the end of June, but owing to some delay did not leave for her first cruise until the 15th July.

Passing out north of Shetland Isles she made for the coast of America, where she was destined to operate between Nantucket and Cape Hatteras. The only known incident which occurred during her journey across the Atlantic is an attack by a British steamer on 26th July which was unsuccessful. She is next reported on the 10th off Nantucket Shoals where she sank 8 small fishing schooners.

From Nantucket she cruised down the coast and sank a steamer on the 12th off Long Island. Still going south she proceeded to lay mines at intervals of about 120 miles between Sandy Hook and Cape Hatteras. She also sank two ships and unsuccessfully attacked a third during this period of her cruise.

On reaching Cape Hatteras, she turned N. E. and on the 17th sank a Norwegian schooner by gunfire. The crew of the boat were given a receipt by the commander of the submarine, signed "Droschen."

Proceeding by N. E. she unsuccessfully shelled a British ship and on the day following stopped a Swedish steamer. This vessel had been operating off the coast of America, which fact was discovered on examination of the ship's log. The commander of the submarine then informed the crew that their vessel would be sunk, but the master protested that she was neutral and an animated conversation ensued between the commander and another officer of the submarine,

at the conclusion of which the vessel was allowed to proceed on condition she was not under charter to the United States.

Still proceeding north, the submarine bombed a schooner on the 24th and sank an American fishing vessel on the 26th about 160 miles from Cape Canso. The crew of the vessel were ordered on board the submarine and sent down below while their vessel was destroyed by bombs. They were afterwards picked up by a fishing vessel and landed at Cape Canso.

The following day the submarine torpedoed a steamer without warning S. of Cape Race. This vessel sank so quickly that the boats could not be lowered and many of the crew were compelled to jump into the water.

From this position she began her homeward journey and cruising round Cape Race made out into the Atlantic where she sank two small schooners on the 30th August.

She is next reported in company with *U-140* on the 9th September, to whose assistance she appears to have gone.

On arrival in the North Sea, she passed the Skaw and Albach Bay successfully, but apparently then ran short of oil, for as she approached Germany, Torpedo Boat Destroyers were sent out to tow her in.

During her cruise she sank 20 ships, the majority of which were American, aggregating a tonnage of 19,913 tons, also 10 sailing vessels.

On the 19th of November she started out for Harwich, where she surrendered on the 21st.

U-111.

U-111 is an Ocean going U-type submarine of the class *U-105–114*, which carried two guns and twelve torpedoes. Her Commanding Officer was Kapitanleutnant Beyersdorff.

She probably had her trials in January 1918, and as far as is known left Germany about the end of March 1918 for her first voyage.

She proceeded out via the Fair Island Channel to the North of Ireland, where she remained two or three days. Then it appears she steamed South into the Irish Sea, where she sank one steamer, and then proceeded further south to the Western Approaches of the English Channel, where she sank another.

She probably left this area about the middle of April and returned home via the west coast of Ireland, sinking as far as is known nothing on her passage home.

Her next voyage probably started from Heligoland Bight on May 27th 1918. She proceeded out to the Atlantic via the North of the Shetlands, having sunk a small vessel in the North Sea.

She is believed to have passed west of Ireland and probably operated from about June 5th–June 14th, in the Bristol Channel, where she sank one steamer of about 2,800 tons and a British armed merchant cruiser of 6,000 tons.

She returned to Germany via the West Coast of Ireland, Muckle Flugga and the Kattegat, arriving in Germany about June 24th.

Her third and last voyage commenced on August 25, 1918, when she proceeded out via the Baltic and Fair Island.

She is thought to have operated from the beginning of September to about September 19th along the parallel of 49 degrees North between the meridians of 11 degrees and 7 degrees west. She had no success, however, and returned via Fair Island and the Baltic, arriving in Germany about the last day of September.

She left Germany for the last time on November 18th and surrendered at Harwich on November 20th.

U. B.-88.

U. B.–88 is a small ocean-going type of *U. B.* submarine, carrying one gun, ten torpedoes and a crew of about 30 officers and men. She was commanded by Kapitanleutnant von Rabenau.

She probably had her trials in February and March 1918, but did not leave Germany until the first week in June.

She proceeded to the vicinity of Flamborough Head on the East coast of England, where she sank two steamers. She apparently had been allotted to the Flanders Flotilla, since she proceeded South and arrived at Zeebrugge on June 12, 1918.

She left there on June 20th and proceeded again to the East coast of England, where she sank six steamers. She was back in Zeebrugge again on July 1st.

On July 29th she left the Flanders coast and then proceeded via the Straits of Dover into the English Channel. Her area of operations during this cruise was probably off Brest, where she torpedoed four steamers.

She returned to Zeebrugge on August 11th, having again passed the Straits of Dover.

Her next voyage commenced about September 12th, when she again proceeded out via Dover to the English Channel (she is believed to have been the last German submarine to have successfully passed Dover Straits).

This time she operated in Tor Bay for about a week, sinking four steamers. She then decided to return to Flanders via the North of Scotland and arrived at Zeebrugge on September 20th only to find that the complete evacuation of the Flanders Coast was taking place.

She was forced to leave there for Germany on October 1st and probably arrived in Germany on October 5th.

She surrendered at Harwich on November 27th.

U. B.-148 and U. C.-97.

Very little is known about these two submarines, neither of which has had a cruise.

U. C. 97 is an improved type of minelaying submarine.

Both of them were still having trials in November 1918.

U. B. 148 proceeded with four other submarines and interned themselves at Karlskrona in Sweden on November 12, 1918.

U. B. 148 surrendered at Harwich on December 1, 1918 and *U. C. 97* surrendered on November 22, 1918.

GERMAN SUBMARINES BROUGHT INTO DUTCH PORTS.

Source: Reliable.

24 March 1919.

(11056 A)

It is reported that the steam trawler *Peters* brought in to Ymuiden on March 22, 1919, a large German Submarine marked *653 V.*

The vessel seems to have all her machinery installed, but not to be entirely completed yet. She was picked up 25 miles West of buoy No. 5 at the entrance to the harbor.

This makes the third German submarine brought into Dutch ports during the last few days. Two of them are lying at Ymuiden and the third one at Hook of Holland. The latter appears to have no machinery yet installed.

MISCELLANEOUS.

FRENCH NAVAL EXPENDITURES.

Source: Reliable.

(11503) **12 April 1919.**

Following are in round numbers as exact expenditures have not yet been determined:

	Francs.
1915	715, 062, 000
1916	880, 662, 000
1917	1, 564, 301, 000
1918	2, 229, 011, 000

THE RUSSIAN (BOLSHEVIK) NAVY.

Source: A sublieutenant and navigation officer in the Imperial Russian Navy who was forced to serve in the Bolshevik Navy until Feb. 25, 1918, when he escaped to Finland.

19 March 1919.

(11520)

The fighting squadron now consists of two battleships, the *Petropavlovsk* and the *Andrei Pervosvanni;* one cruiser, the *Oleg;* two large destroyers, the *Azard* and the *Gavryil;* three smaller destroyers, the *Gaiclanaix*, the *Amuretz* and the *Ussurietz;* four submarines, the *Tigr*, *Tyr*, *Tagnajr*, and *Ryss;* and four mine sweepers. All other vessels are in reserve or out of commission.

Battleships.

Petropavlovsk. Now at Kronstadt. Has oil and coal. Present complement 600 (instead of 1,200) men, collected from other vessels. Many of sailors are from the Bolshevik army. Officers young and untrained. No gunnery or torpedo practice since 1917. Men ignorant as to what duties are; officers prefer not to be assigned to ship.

Andrei Pervosvanni. Same as *Petropavlovsk.*

The battleships *Gangnt*, *Poltava* and *Sevastopol* have all been put out of commission, owing to the channel between Petrograd and Kronstadt being only 25 feet deep. They have neither shells, coal nor oil, except such as is required for heating purposes. They have

a complement of about 300 men and are used as barracks for the crews of those torpedo boats which have been designated "permanently in keeping." All are at Kronstadt.

Imperator Pavel (now named *Respublika*). In reserve and manned. Coal merely for heating purposes. Insufficiently officered. Might be gotten ready in a few months. Lying at Kronstadt.

Rurik. Lying at Kronstadt. Same conditions prevail as on *Paul I. Imperator*.

Tsesarevitch (now named *Gradanin*). Lying at Kronstadt. "Permanently in keeping." Cannot put to sea.

Cruisers.

The cruisers, *Admiral Mersaron*, *Bogatyr*, and *Bayan*, all "permanently in keeping." Merely manned by a few guards and without crews. Their officers have been transferred to the *Petropavlovsk* and *Andrei Pervosvanni*. They are all at Petrograd.

The same conditions prevail on these: The cruisers *Diana*, *Avrora*, *Gromoboi*, and *Rossiya*, all of which are at Kronstadt.

The *Oleg*. Now at Pertograd. Took part in the operations against the Esthonians and bombarded Gungerborg. In 1916 received new armaments of 16–5″ guns. Captain and officers all previously in the service. The vessel itself is in fairly good condition. After the *Atroil* and *Miklucha* were captured she was ordered to their assistance but was unable to proceed owing to trouble with the machinery of the rudder.

Gunboats.

Khrabri (Kronstadt). Has no engines.

Khivinetz (on the coast, north of Kronstadt). Its guns have been sent to the front. Now serving as barracks.

Groziastchi (now at Petrograd). Has no engines.

Gilyak. Taken by Finns.

Bobr. Taken by Esthonians.

Torpedo-Boat Destroyers.

Azard and Gavryil. Were completed at the same time as the *Avtroil*. The destroyers *Amuretz*, *Gaidamek*, and *Ussurietz* are all at Petrograd. Last autumn they were included in the fighting squadrons, but have as yet neither guns, sights, projectiles, nor coal. After the guns are in place another month will be required for the work on the electric mounting of sights. The Amuretz has only two out of its three boilers, out of carelessness of one of the watchmen.

Vsadnik. Ran aground in the Neva in 1918 and tore a big hole in her hull. Must be drydocked for repairs.

Destroyers.

Three boats of the *Emir Bukharski* type, *four* of the *Dostoini* type and *four* of the *Pritki* type, and the *Turkmenetz Stavropolski* have since the fall of 1918 been on the Volga in Astrakhan.

All other destroyers have since 1917 been under repairs in Petrograd.

Boyevol Class (Seven), *Lovki* Class (Eight) Are all in reserve, partly in Kronstadt and partly in Petrograd.

Submarines.

Tigr, *Tyr*, *Tagnajr*, *Wepr*, etc. Belong to the fighting squadron. Personnel is made up of old sailors and technically trained men. The captains are trained men, but young and with little experience. The torpedoes are stored on shore. There is no practice or training or diving work. The *Tyr* went to Reval on a scouting trip last November. *Pantera* and *Wepr* are in Lake Ladoga. The submarines lack oil for sea duty.

Mine Layers.

Two mine layers are under construction but material is lacking for their completion.

Amur. Considerable reconstruction of this vessel started in 1917; not yet completed.

Tena (now at Petrograd) and the *Volga* and *Narowa* (both at Kronstadt) are in good condition for mine laying. The *Narowa* laid some mines near Ino in the summer of 1918 and drew the fire of the Ino batteries.

Onega. Serves as depot ship.

All the torpedo boats and destroyers have been converted into mine layers, the larger carrying 60–80 mines, the smaller 20–40. A number of steamers and motor vessels have likewise of late been converted into mine layers.

Mine Sweepers.

There are 6 to 8 of these belonging to the fighting squadron, manned by old, experienced men.

The submarines, minelayers and mine sweepers are today the best equipped and manned boats in the Russian Navy.

PERSONNEL.

The sailors may be divided into three categories; viz., Bolsheviks (including commissioners), men with no interest in politics and newly mobilized men.

The Bolsheviks, who very generally are appointed commissioners on the vessels, or members of special committees, are anxious as soon

as possible to put the vessels in seaworthy condition and power. Their orders generally get no further than on paper, owing to the complete disinclination for work among the crews.

The men with political interest serve because of the high pay, good clothes, inexpensively purchased food, because of special licenses, and practical idleness. Following monthly pay is received by them: Sailors 700 roubles; specially honored men 800–900 roubles; commissioners 1,000 roubles; officers 1,000 to 1,500 roubles; admirals, 2,400 roubles.

The newly enlisted sailors are sullen at having been recalled to service after the Brest-Litovsk peace and their subsequent return to their homes. They receive the following monthly rations: 2 pounds of sugar, 2 pounds of butter, 3 pounds of meat (included in this are fish, game or canned meat), 2 pounds of groats and 1½ pounds of bread per day; twice a day from 2 to 4 plates of poor soup.

The crews of the larger reserve ships live in barracks or on other vessels. Fear and distrust poison their lives. They hate the government and fear one another. Many of them act as detectives. The commissioners watch the officers. If a sailor is able to give accusing information against an officer, and delivers same at "Gorohovaya 2," his chances are good of becoming a commissioner and advancing later to become president of his special Ship's Committee. The reputation of the sailors is especially bad, both as cutthroats and cowards. When the *Avtroil* was captured, the captain of the *Miklucha*, as well as other officers, could not put to sea owing to "too important duties on shore."

The position of the officers is well nigh intolerable. They are distrusted and continuously arrested on the most absurd suspicions. Many were shot during the summer of 1918; others are in prison. The entire staff of the mine and torpedo boat flotillas are in jail, accused of having conspired with the British Embassy. Quite a few of the old officers managed to escape to Finland, Siberia, and the Ukraine. All officers are now forced to sign a paper which states that the signer recognizes the fact that his family will immediately be arrested should he attempt treachery or escape. The fate of their families deters most of those still remaining from trying to escape. Ten thousand roubles will purchase anyone over the Finnish border—4,000 if they are willing to take the chance of having an ordinary peasant make the trip in his sleigh.

The commander-in-chief is Rear Admiral Zelenoi. Admiral Zarobajev was dismissed after the surrender of the Avtroil.

Owing to the lack of technically-trained men, schools of gunnery, torpedo, and mine work and navigating have now been opened in Petrograd. The course lasts two years. There are likewise two kinds of sailor's schools, one for the non-commissioned officers and one for non-commissioned officers desirous of becoming "red officers." The

latter are to replace or fill the places of junior officers. The "red-officer" course lasts four months, but is now to be lengthened to six or eight.

At a meeting of the Committee of National Defense held in Petrograd in the middle of February and presided over by Trotzky, the latter declared that the lack of discipline of the fleet and the many desertions called for drastic reorganizing measures. He advised the abolishment of the committees on the various vessels and the return of authority to the officers. As yet, however, no change has taken place, the Committees issuing all orders relative to each vessel.

The service rendered by the men on watch is particularly deplorable. Men expected to watch boilers or dynamos go to sleep, the boilers burn out and the engines are damaged. When they then need repair, special renumeration is demanded for the repair work.

GUNNERY.

Since the last fight with the Germans in 1917 there has been no target or other practice whatever, excepting a little by the *Andrey* and the *Oleg* (with 37 mm. guns).

The President of the Committee on the destroyer *Gaidamak*, when the informant was navigating officer, stated to him, in case the English fleet met them, the crew would surrender at once.

GERMAN VIEWS ON THE POSSIBILITIES OF GERMANY RECEIVING NECESSARY RAW MATERIALS AFTER THE WAR.

Source: Reliable.

26 October 1918.

(9904 A)

One of the principal questions which is attracting the attention of German business and political circles is the question of guaranteeing Germany, after the war, a sufficient supply of raw materials. The great lack of raw materials was seriously felt by Germany a few months after the start of the war in supplying her population with necessities, but Germany has for a long time consoled herself that it was only a passing period of shortage, due to the war, and all shortage would immediately disappear once peace was restored. The threats of an economic boycott after the war were believed by German officials to be for moral effect only. Since these were undoubtedly supposed to be only threats, Germany had great confidence that her newly invented substitutes would carry her through the war. However, since Germany has begun to realize that the economic war of the Entente is not mere bluff, and that substitutes cannot even

in a limited way supply Germany with raw material, the question of source of further supplies has come in for lively discussion in the periodic press of Germany.

The abstracts and extracts from current articles show how seriously they are now considering this matter; these not only show that they realize the possibility of an economic war but they are already taking steps necessary to combat successfully such a condition.

The article published in the Vossiche-Zeitung is of exceptional interest. First of all, the paper wishes to show how far the economic threats of Germany's enemies are actually practical—what chances of success they have—and the figures of pre-war German imports given by the paper forces it to a very pessimistic, for Germany, conclusion. According to the figures given, the German imports of raw materials in 1913 were worth 5,262.7 million marks, divided in part as follows:

	Marks.
Raw wool	412,700,000
Cleaned wool	61,400,000
Cotton	627,000,000
Raw silk	158,000,000
Jute	94,000,000
Flax and flax oakum	74,300,000
Hemp and hemp oakum	44,500,000
Skins	322,000,000
Iron ore	227,000,000
Copper	335,000,000

The above figures illustrate very well the economic dependence of Germany on foreign countries, and the paper draws special attention to the fact that the more necessary products were obtained before the war either direct from England, America and other countries of the Entente or from those countries which economically and politically are in the sphere of influence of the Entente. Thus the figures prove that the main quantity of cotton imported into Germany came from America, jute from British India, hides from Argentina, gutta percha from British India and Brazil, tin from Bolivia, silk from Italy, sheep wool from Australia and British South Africa; from the countries under the influence of the Entente Germany received oil, beans, vegetable oils and palm seeds. If it is taken into consideration that, owing to Germany's isolation from the world's markets during the war, her enemies have been able to destroy the position won by Germany on the world's markets and to obtain for themselves a firm hold on these, the paper concluded that it is quite probable that Germany could be cut off from the world's supplies of raw materials.

The paper further points out that the carrying out of the economic threats of the Entente will have fatal results for German national economic life. First of all, it would be an irreparable blow to the

textile industry. The 813,000 enterprises in spinning (the large part of which are now idle due to the lack of raw materials) would have to liquidate finally after the war, resulting in 2¼ million workmen finding themselves without the means of support. Germany would be forced to obtain her textile goods at very high prices from the Entente powers (England, America, Japan and India).

The oil manufacture would suffer in no less a degree because Germany would not be able even approximately to supply her demand for oil beans either from her own territories or from those territories in her sphere of influence. The lack of such supplies would not only force her to discontinue the production of oils, greases, candles and soap, but, what the paper considers more important, cattle raising would be seriously affected, since the manufacture of by-products—mealcake—would be stopped and thus a considerable source of cattle food would here cease to exist. The importance of these products in feeding cattle can be shown by the following figures: from 534,375 tons of feed cake and 1,715,000 tons of oil beans imported into Germany in 1913, there were received 800,000 tons of vegetable oils, and 900,000 tons of cattle feed. The cattle raising industry would thereby be compelled to limit cattle breeding which, in its turn, would reduce the amount of milk and butter needed by her population, as well as reduce the quantity of manure which would thus reflect on the annual harvest. In this way, the enemies of Germany undermine her vital means of existence.

A heavy blow to German economic life would be her inability to get sufficient copper. The latter is not only required for war industries but is also indispensable for the highly developed German electrical peace industries. It is true that in 1912 the German home production was 45,000 tons of copper, but in 1913, 225,000 tons of copper had to be imported from abroad, of which 197,000 tons came from the United States.

The lack of sources of raw materials would also prove fatal to other lines of industry. The paper is of the opinion that the economic war planned by German's enemies would shake German economic life to its very foundation and would cause such widespread emigration of her working classes that German industry as a factor in the world's economic life would be reduced to nothing.

But if Germany is so dependent economically on her enemies, would it not be a serious blow to their own economic structure if they were to refuse the business of such a large consumer? The paper heatedly argues that the optimism based on such considerations of various German industrial circles does not correspond with the actual state of affairs since the Entente can much easier do without the German market than the latter can do without the supplies of raw materials. In support of this contention the paper points out that

the average crop of 1913 of the United States was 3¼ millions, while the German import of American cotton in the same year amounted only to 369,000 tons—thus losses of German consumers would not even be felt by the United States. The same condition holds for sheep wool and many other products.

If even the economic boycott of Germany should affect certain industries of her enemies (for example, Italian silk and American copper) the loss of the German market will not be so serious as to compel the Entente to renounce its plans.

Is not an economic war a two-edged sword which perhaps could be used successfully by Germany itself? However doubtful the result of a fight with like weapons is, the paper nevertheless is compelled to admit that this method of fighting would not in the present case succeed. Of course Germany might prohibit the export of potassium salts, medicines and certain dye stuffs. The lack of the first would only bring out the inventive genius of the American industry; as regards the others, any restrictions of free export would first of all reflect most unfavorably on German industry—such measures would only help the enemies of Germany in driving her off the world's markets.

How then must Germany divert the fatal blow? Luckily the Germans have always had in reserve a well tried, never failing method which is equally useful in solving various problems—the German sword. The victorious German Army will always be able to force the enemies of Germany to renounce all economic measures aimed at her.

The paper is also of the opinion that Germany must not be content with general promises—at the coming peace conference details must be thoroughly worked out regarding the quantity of raw materials which will be put at the disposal of Germany, their prices, the time and conditions of their delivery.

Interesting details regarding the economic demands which Germany must put before the Entente at the peace conference are found in the Norddeutscher AAlg. Zeitung in the article written by a prominent merchant from Bremen, Dr. A. Loman. The demands are the following:

1. The British Government must set aside, from the raw materials purchased by it, sufficient to provide the German industries for the first two years of peace.

2. Germany must receive back all the tonnage illegally taken by the enemy or a like amount must be given her; in addition Germany must also be given sufficient tonnage to ensure a continuous import of raw materials.

3. Germany's enemies must renounce the resolution of the Paris Economic Conference.

In the event that the above mentioned claims are not fulfilled the Central Powers must do everything possible to prevent the raw materials of Britain's colonies from reaching their markets.

This problem is solved even easier by Admiral K. von Hofe. In an article published in the Vossische Zeitung, the Admiral demands that before an armistice is proclaimed, England must deliver, or at least agree to allow to be delivered, to Germany sufficient of those raw materials needed by German industry to resume peace time production; the delivery of raw materials must continue during the whole period of negotiations so as to enable Germany, even before peace is finally signed, to have a supply sufficient for one year. In carrying this out all German boats captured must be returned with full cargoes of raw materials. The fulfillment of these demands by the Entente, the Admiral believes, would be easy to force by threats to renew submarine warfare and in order to make this threat a real one, during peace negotiations all submarines must be held ready to immediately resume their devilish work should the enemy make any slight effort to hinder the supplying of Germany with raw materials. Von Hofe is convinced that the English nerves will not be able to stand such a recurrence and that in the end Germany's claims will be fully agreed to.

If even in this way on one hand great hopes and expectations are placed on the German sword, on the other hand Germany is also working hard to solve that question in a more rational way—by using those countries not under the control of the Allies. It is her aim to develop their sources of raw materials.

In seeking markets free from Entente control Germany's attention first of all turns to what formerly constituted Russia. The Vossische Zeitung publishes an interesting article regarding the possibilities opened to Germany in that "enormous" country. The paper gives the following statistical material: The Russian Empire before the war had double the number of spinning machines that Germany had and from 65–70 per cent of the annual requirements of her cotton mills were supplied by Caucasian and Central Asia cotton. The Russian government hoped by increasing the area under cultivation to increase by 50 per cent the annual harvest of cotton. If it is taken into consideration that the demand for cotton of the present Russia after the loss of her frontier districts could be more cheaply satisfied by buying American cotton, and on the other hand that it would be possible through fertilization to obtain far better results than even the Russian Government had in view, the paper is of the opinion that what was the former Russian Empire will after the war be able to become a larger supplier of cotton to Germany.

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The development of sheep breeding in Russia with the help of Germany might also have great importance—for that purpose the vast steppes of the Ukraine, the valleys of the fertile Ural and the hilly districts of the Caucasus present most favorable conditions. The paper is also of the opinion that cattle breeding, if well organized, presents great opportunities. An increase in cattle raising would mean a larger supply of leather. The increase of refrigerator installations would allow for greater export of meat.

Parts of the former Russian Empire have also big possibilities in the cultivation of silk. The paper remarks on the high plane to which the silk worm culture in the Caucasus has been developed.

The raw silk produced is in part worked up locally and sold there at low prices and in part sent to the Moscow silk mills where a product equal to that of the Lyons mills is made and sold at considerably lower prices, although these prices are considerably above those ruling in the Caucasus. The climatic conditions of the Caucasus permits a further expansion of silk worm breeding, and in this respect this district of former Russia can become an important factor in the economic life of Germany.

In other lines the paper notes the importance Russia has for Germany as a large supplier for her metallurgical industries—the rich iron and copper deposits of the Urals and the Caucasus. The paper believes that similar deposits of these and other metals, including the precious ones, must be found in other parts of Russia; only a careful study of the country is required. That there is great wealth hidden underground in Russia is indicated by the great interest America has taken in that direction there. The paper refers to the report of the American Scientific Commission (the latter visited regions of Siberia and Central Russia), which shows that in 50 years Russia will be a country of unlimited business possibilities. The paper urgently recommends the German Government to commence at the present time to develop the resources of that "colossal" country.

Of other markets where Germany has a chance not only to secure raw materials but also to dispose of her own goods, the paper draws special attention to Mexico. In Mexico German industry before the war had won a prominent place; second to America. The strengthening of the economic ties already won by Germany in that country is even more pressing owing to the natural wealth of that country and the scarcity of its population (15 million on an area of 2 million square kilometers), presenting very favorable conditions for Mexican export. The following products Germany can get from Mexico: silver, copper, lead, grain products, gutta percha, sugar cane, hemp, coffee, cacao, cattle, and a large amount of petroleum. That Mexico is interested in having close business connections with Ger-

many is best of all proven by the pre-war figures of German import from Mexico and the German export to Mexico. Germany exported to Mexico 48 million marks worth of different goods and imported 25 million marks worth. If it is taken into consideration that some products made in Germany, (for example: machinery, textile and mechanical products, chemicals) are much used in Mexico, the paper believed that there are opened to Germany in that country particularly interesting economic possibilities which can in a great measure lessen the effects of the enemy's projected economic war against Germany.

The business circles of Germany have also great hopes in Persia. There are some not uninteresting data in the articles devoted to the above question in the Frankfurter Handelsblatt. The paper is of the opinion that political considerations have already brought forward the importance to the Central Powers of Persia and its significance as a political factor, devoting to it a prominent place in the Balkan policy of the Central Powers. The paper is of the opinion that it is economically of greater importance as a rich source of raw materials. It draws special attention to the oil fields of Persia and refers to the results which have been obtained in that direction by the exploitation already undertaken by the English Company—Anglo-Persian Oil Company. This company at the present moment is winning a quantity of kerosene equal to the pre-war output of the whole of Galicia and Roumania combined. The Persian oil is distinguished for its high quality, rendering it more valuable than American oil; it contains a high percentage of benzine, lighting and heating derivatives with very high co-efficients of heat and also a considerable quantity of paraffin.

They fully agree with the opinion of the President of the above mentioned English Company—as regards oil Persia in time will take a place similar to America. The paper however regrets to state that all of South Persia has economically been already firmly won by the British. Therefore German initiative must be directed to Northern and Central Persia, where rich oil fields (especially in the regions of Kazvin and Teheran) have been found.

As a result of investigations made by Persian scientists, these same regions are said also to contain rich deposits of metals, especially copper (the province of Massanderan, lying 150–200 km. from Teheran, and in the Caspian Sea regions).

If it is also taken into consideration that there are in these same regions enormous coal deposits, sufficient, according to Persian explorers, for industrial purposes, as well as for export into Turkey, the writer concludes that there are here to be found particularly brilliant possibilities for employment of German capital. Beyond the

coal as an important source of power for industry, the paper points out that the large number of water falls and cascades in that country can be used to advantage in generating electric energy.

The great drawback for business development in that rich country is the unsatisfactory state of the roads, and here Germany must make every effort to construct a system of convenient means of communication. Special importance is attached to the matter of water routes leading to and from the Caspian Sea.

The above mentioned innumerable riches of Persia can be used effectively by Germany only if German capital in Persia will not be subject to too great a risk. In view of the unsettled conditions of social and political life in Persia, the paper considers that special measures for guaranteeing capital are required. The question has already passed on to political ground: Germany must create for herself in Persia a firm political situation; she must demand of the Persian government a firm guarantee in the form of a pledge on a large scale of the Persian government provinces. Another way of guaranteeing German capital must be by an active participation of Persian capital in German enterprises.

That the above mentioned views have received a prompt consideration of the leaders of political circles in Germany is best evidenced from the place in the program of the forthcoming Constantinople Conference devoted to the regulation of the Persian question.

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Number 6—1919

OFFICE OF NAVAL INTELLIGENCE

MONTHLY INFORMATION BULLETIN

15 JUNE 1919



WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 June 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A Digest of Reports received during each month by the Office of Naval Intelligence is appended to this Bulletin. In case an officer has a special interest in any subject appearing in this digest, a copy of the report will be provided him on application to the Office of Naval Intelligence.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

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15 JUNE 1919.

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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CONFIDENTIAL.

OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 6—1919—15 June 1919.

FOR CONVENIENCE IN ROUTING.

Officer.	Initials.	Date received.	Date forwarded.
Captain			
Executive Officer			
First Lieutenant			
Navigating Officer			
Gunnery Officer			
Communication Officer			
Engineer Officer			
Medical Officer			
Supply Officer			
First Division Officer			
Second Division Officer			
Third Division Officer			
Fourth Division Officer			
Fifth Division Officer			
Marine Officer			

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CREW OF NC-4 AT HORTA DIRECTLY AFTER LANDING.

Left to right: Lieut. Stone, C. M. M. Rhodes, Lieut. Hinton, Ens. Rudd, Lieut. Breeze, Lieut. Commander Read, Admiral Jackson.

Official photograph, United States Naval Air Service.

AVIATION.

THE TRANSATLANTIC FLIGHT—EXTRACTS FROM OPERATION ORDERS AND SPECIAL INSTRUCTIONS FOR SURFACE AND AIRCRAFT TAKING PART.

Source: Naval Operations. **15 April 1919.**

1. The success of the flight depends upon the efficiency of communications. Efficient communication depends upon cooperation and the knowledge of what each radio operator is going to do next. Therefore, the instructions contained in this pamphlet must be strictly followed.

2. Communication during the transatlantic seaplane flight is divided into two separate problems, viz:

First. The period before each leg of the flight, during which time information regarding weather conditions must be collected and disseminated.

Second. The periods of actual flying, during which communications must be maintained with the seaplanes, their navigation facilitated, and report of their movements disseminated.

The instructions regarding each problem differ greatly, and it is essential that radio operators realize the exact conditions of both.

3. Greenwich mean civil time will be used for all communication purposes. Greenwich mean civil time is the civil time of the meridian of Greenwich, the day commencing at midnight and the hours numbered from zero to twenty-three. All radio operators shall keep their watches and clocks set on Greenwich mean civil time. On account of the radio schedules, it is imperative that the clocks be accurately set and frequently checked up.

4. The radio and visual call letters of the destroyers shall be the station number of the position to which the destroyer is assigned. The station numbers and their corresponding positions in latitude and longitude are tabulated in the commander destroyer force operation orders. The commanding officer of each destroyer shall be responsible that the radio operators under his command are familiar with the number assigned to their vessel.

THE PERIODS BEFORE EACH LEG OF THE FLIGHT.

Destroyers will be assigned stations on the course of each leg of the flight. Battleships equipped with arc sets will be stationed as follows:

(*a*) Latitude 46–56 N., longitude 31–01 W.
(*b*) Latitude 50–25 N., longitude 39–40 W.
(*c*) Latitude 36–00 N., longitude 42–00 W.
(*d*) Latitude 40–00 N., longitude 52–00 W.
(e) Latitude 48–00 N., longitude 12–00 W.

Before starting each leg, the seaplanes must receive weather reports. Meteorological observations will be taken in various parts of the United States; in Europe and the Atlantic Ocean at 0100 (1 a. m.), 0700 (7 a. m.), 1300 (1 p. m.), and 1800 (6 p. m.), Greenwich mean civil time.

These observations must be forwarded immediately to the weather forecaster at the seaplane base and to the Weather Bureau at Washington, at which places the data is used for making the forecast.

NOTE.—When seaplanes have left Newfoundland the Weather Bureau will not receive the reports, as the forecast will then be made by the local base forecaster at Ponta Delgada and Lisbon.

The Weather Bureau synoptic reports and forecast is sent to the seaplane starting places in the western Atlantic. In the eastern Atlantic the British Meterological Office will forward its reports to the forecaster at the seaplane bases in those waters.

The seaplane base ships will control traffic. Every effort shall be made to avoid interference with the base ships. No messages, other than very urgent messages such as distress calls, shall be sent during the periods allotted to the forwarding of meteorological data. At other times such messages as the destroyer force commander may require shall be sent.

The absolute reliable range of a destroyer is assumed to be 250 miles; a battleship equipped with arc, 850 miles; a seaplane in flight, 125 miles, and on water, 50 miles.

Reports from Europe will be sent as follows:

At 0203 and 1430.

European reports (sent in British weather code consisting of groups of figures) will be broadcasted from Carnarvon call MUU, on 14,000 meters arc. The *Aroostook* at Newfoundland shall intercept at Carnarvon. Bar Harbor will send the European report direct to the Weather Bureau on the leased land wire. Sayville will rebroadcast these reports when the United States synoptic reports are transmitted.



NC-4 LEAVING TREPASSEY FOR AZORES.

Official photograph, United States Naval Air Service.



NC-4 UNDER WAY FOR AZORES AT TREPASSEY.

Official photograph, United States Naval Air Service.

United States reports will be transmitted as follows:

At 0300, 0900, 1500, and 2000.

Sayville, call NDD broadcasts United States synoptic reports on 7,800 meters arc. Sayville will also rebroadcast the battleship weather reports and the European reports on this schedule. The *Aroostook* will intercept this schedule.

At 0400, 100, 1600, and 2100.

Sayville will broadcast Weather Bureau forecast and will rebroadcast United States synoptic reports on 7,800 meters arc. The *Aroostook* shall intercept this schedule, and if repetitions are necessary they shall be requested via St. Johns. United States synoptic reports are in Weather Bureau code.

If bad weather conditions are encountered during the flight the seaplanes may land in Horta. If such be the case the *Melville* (or Ponta Delgada) will transmit weather reports to the *Columbia*. Communication between the *Melville* and the *Columbia* will be on 952 meters. Ponta Delgada's working tune is 2,000 meters.

PERIODS OF ACTUAL FLYING.

When the flight commences, the Greenwich mean civil time of start will be forwarded all vessels of the patrol, who will immediately broadcast the information to notify merchant vessels that might be in or crossing the route. The text of the message to merchant vessels shall be:

"U. S. Naval transatlantic seaplace flight in progress: ships are requested to restrict use of radio apparatus to avoid interference with seaplanes."

(*a*) When the seaplanes leave Rockaway the time of start shall be transmitted by land wire to Navy Radio, New York The latter will transmit this information immediately to Navy Radio, Boston: Navy Radio, Washington; and Navy Radio, Bar Harbor. Boston will immediately deliver same by radio to station ships *Nos. 1*, *2* and *3*, using 952 meters spark. Bar Harbor will deliver the message to the *Baltimore* at Halifax, using 952 meters spark. In addition, Boston, Bar Harbor, and New York will broadcast the information on 600 meters to merchant vessels; the broadcast will be sent once only.

(*b*) When the seaplanes leave Halifax the *Baltimore* will transmit the time of start to station ship *No. 1* and to Bar Harbor on 952 meters. Station ship *No. 1* relays the message to the eastward. Bar Harbor places message on leased wire to Navy Radio, Washington. The necessary information for merchant vessels will be broadcasted on 600 meters by the *Baltimore*, taking care that interference with the seaplanes is not caused.

(*c*) When the seaplanes leave Newfoundland the *Aroostook* will transmit the time of start on 756 meters spark to station ship *No. 1*, from where it will be relayed to the eastward. Station ships will broadcast the necessary information to merchant vessels taking care that interference with the seaplane is not caused. The *Aroostook* will notify Navy Radio, Washington, via St. John's. Upon receipt of this information at Washington, it will be broadcasted immediately on 4,000 meters arc; and from Sayville on 7,800 meters arc during the schedules set aside for the transmission of weather reports.

(*d*) When the seaplane leaves Ponta Delgada the *Melville* will notify station ship *No. 1*, on 756 meters, from where it will be relayed to the eastward. Station ships will broadcast the necessary information to merchant vessels, taking care that interference with the seaplane is not caused. The *Mellville* will cable this information to Navy Radio, Washington, and to commander United States naval forces operating in European waters. The *Shawmut* will notify battleship *E* by radio via Brest or direct, if possible (using 952 meters if direct, or by landline if via Brest). This information will be broadcasted also from Sayville on 7,800 meters arc at 0300–0900–1500 and 2000. *D* will intercept Sayville and relay to *C*.

(*e*) When the seaplane leaves Lisbon the *Shawmut* will notify station ship *No. 1* on 756 meters, who will relay it to the eastward. Station ships will broadcast the necessary information to merchant vessels, taking care not to interfere with the radio communication of the seaplane. Station ship *No. 3* will relay the information to the battleship *E*. The *Shawmut* will notify Navy Radio, Washington, and commander United States naval forces operating in European waters by cable.

After the flight commences it will be no longer necessary to forward weather reports by radio to the base ships; but ships must be prepared to furnish the seaplane with these reports when requested to do so.

Communication between seaplanes and between seaplanes and destroyers will be maintained by radio and Aldis signal lamps. At night, patrol vessels will keep searchlight trained into the direction from which the wind is coming. They shall turn on light when the next vessel to westward announces passage of seaplane or at the hour the passage should have been made, calculated from probable speed of seaplane. (This is in case no report is received.) In case of mist or thick weather they shall sweep the heavens in vertical plane until radio from seaplane is received that the vessel is sighted.

Radio communication between planes and destroyers will be controlled throughout the entire flight, when the planes are in com-



TREPASSEY HARBOR, SHOWING DESTROYERS.

Official photograph, United States Naval Air Service.



NC-3 AT PONTA DELGADA, SHOWING WRECKED LOWER WING.

Official photograph, United States Naval Air Service.

munication range of destroyers (200 miles), by the radio officer on the flag seaplane. In case the flag seaplane is forced to land on the water, the communication by radio will be controlled by the next seaplane in formation, and will be so controlled until the original flag seaplane is in the air and in position as such. The other seaplanes not controlling communication will listen continuously on 425 meters for the radio control seaplane, and will shift to 1,512 meters (which is the destroyers wave length) only when the radio control seaplane has requested radio compass signals from destroyers or is exchanging messages with the destroyers.

Call letters of the aircraft are as follows:

NC1, NC2, NC3, NC4 } Seaplanes.
SOS Distress calls on water or in air.
UU2 Emergency call to stop all communication and listen for flag seaplane.

The call letters of the destroyers are the "Station numbers," i. e., the numbers assigned to destroyers according to their positions on the course. The numbers start with No. 1 for the position farthest west with a new series for each leg of the trip. These numbers are the same as those outlined in the instructions for the "Periods before each leg of the flight."

EMERGENCY PROCEDURE.

In case of failure of material that will necessitate immediate or eventual forced landing, planes shall send out an S O S call, giving position, and, if time permits, cause of landing. If immediate landing is not necessary, they shall ask for directional signal from nearest patrol vessel and fly toward that vessel, keeping said vessel informed of their position. If immediate landing is necessary, they shall continue communications from the water.

When patrol vessels receive S O S calls the two nearest to the indicated position of the plane shall proceed to her assistance with all possible speed unless notified otherwise. Upon arrival, if repairs are possible, they shall lend all assistance, and in case repairs are not possible the plane will be taken in tow by one destroyer, which will proceed toward nearest port. In case plane becomes too damaged to be towed after rescuing personnel, the patrol vessel will make every effort to salvage engines from the wreck. Senior officers of each group of five destroyers will utilize reserve destroyer to best advantage in an S O S emergency.

If above occurs at night, patrol vessels shall, while proceeding to plane, keep ship brightly illuminated, shall keep searchlight sweep-

ing heavens, and shall keep bright lookout for Very signals, the color of which will indicate the character of forced landing and condition of plane.

If while proceeding to assistance of a plane on water a patrol vessel sights another plane in air, it shall radio or signal its duty and, if requested, send to plane in air true bearing and distance from her then position to next vessel on station.

Patrol vessels proceeding to assistance will make heavy smoke by day.

Planes on water during darkness indicate their position by radio, Very pistol and flares.

Green star—Can get off again, no assistance required.

Red star or flare—Assistance required.

OPERATION ORDERS FOR PATROL VESSELS.

Upon arriving in position and at predetermined date and hour, those designated as meteorological ships will send in weather reports as per schedule and communication orders.

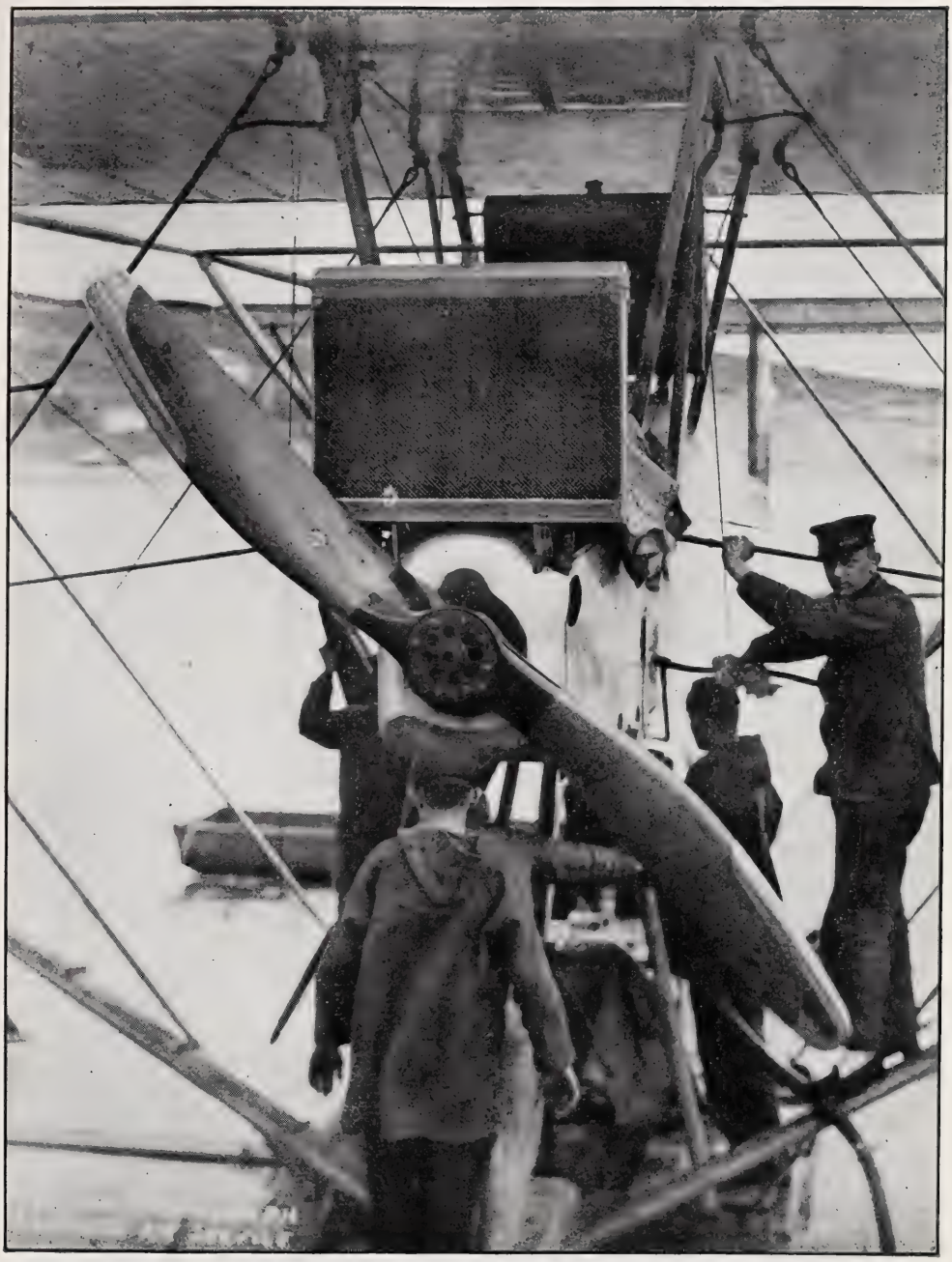
Patrol vessels in position may steam back and forth in area within a radius of 20 miles of station position on such courses as may be most comfortable, considering direction of sea, until flight has started. When flight has started they shall go to the station points assigned them and shall, when planes pass next vessel to west, remain as closely as possible in exact position unless called by S O S or until passage of planes.

When a patrol vessel receives report that plane has passed the vessel next to westward, it shall commence smoking in daytime and shall continue to smoke until last plane is passed or accounted for. Knowing the time of start of flight a patrol vessel will have some idea of time of arrival of the planes, and in case a plane misses one patrol vessel the next to eastward would receive no notice to commence smoking. Therefore, in case the patrol vessel next to westward does not sight and report planes a vessel shall commence to smoke three-quarters of an hour before time of arrival of planes as estimated from information received as to progress of flight.

In case a patrol vessel is off station during flight, due to answering an S O S or for some other emergency, it shall make smoke as per above paragraph, but shall signal to planes that it is off position answering S O S.

After last plane has passed and been lost sight of patrol vessels will carry out destroyer force commander's orders.

Upon being notified that she is sighted, or when planes are in sight, a patrol vessel shall stop smoking and immediately put herself upon the course to the next patrol vessel *and proceed slowly on this*



NC-4 WARMING UP MOTORS WITH STEAM.

Official photograph, United States Naval Air Service.



NC-3, SHOWING RUDDERS AND DAMAGED AILERON.

Official photograph, United States Naval Air Service.

course. This will enable the plane to check course and to determine the leeway or drift. After a plane has passed from sight of naked eye the patrol vessel shall return to her station position, unless all planes have passed, and resume smoking for the benefit of other planes. At night she shall have both truck lights on.

As soon as it has been ascertained that planes have passed next station to westward, patrol vessels in the night zone shall train searchlight into the true surface wind, and shall commence to fire star shells every five minutes until plane reports sighting. Star shells will be fired to the north on 75° elevation and fuses set for five seconds unless notified otherwise by seaplane. Searchlights shall be turned on as per paragraph 3 and kept on until last plane has passed or been accounted for. In case of mist or thick weather they shall sweep heavens in vertical plane into true wind until radio from plane is received that vessel is sighted, when the beam will be steadied level.

SEAPLANE DIVISION OPERATION ORDERS.

The following orders are to be considered as a guide to be followed under normal conditions but not to be considered binding in cases of emergency. In general, if commanding officers desire to do differently than herein laid down they should, if practicable, obtain the permission of flag seaplane. If not practicable they should report reason immediately afterwards. Different procedure may be ordered at any time by direction of flag seaplane.

Division commander will take off first and flag seaplane will be followed into air by others in prearranged sequence as quickly as possible. Formation will be maintained on a line of bearing as directed by flag seaplane. Flag seaplane will notify others when leaving formation, giving reason and instructions as to procedure of those remaining. Under normal conditions other planes will follow movements of flag seaplane unless otherwise directed.

Standard speed, altitude, climb, and glide will be used except when otherwise directed. Standard speed shall in all cases be division average economical speed. Standard altitude 1,000 feet; standard climb 50 feet per minute maintaining standard speed. Standard glide at angle necessary to maintain standard speed with throttles closed. Interval easy visibility and not more than 3 miles or less than 400 yards; altitude to be maintained approximately the same as flag seaplane.

Standard altitude may be varied at discretion of flag seaplane but the altitude will probably not exceed 5,000 feet.

A sharp lookout shall be kept on flag seaplane for visual signals in addition to the radio watch.

In passing over destroyers the nearest plane may be directed to check base course, notifying others that it has done so, giving drift of plane. If flag seaplane passes over destroyer others may follow if they desire, but will resume positions directly afterwards.

In case a plane gets separated from formation it shall make the best of its way along the course until normal conditions are obtained again, when it will endeavor to rejoin flag seaplane. Such a plane shall make reports to flag seaplane of position and condition when directed.

In case of running into clouds, fog, or rain without previous orders as to procedure to be taken, all planes will start standard climb and continue until next plane ahead can be seen or until other orders are received.

If flag seaplane orders any plane to perform a special maneuver other planes will also acknowledge message.

In case a plane is forced to land the others shall remain in the vicinity until a report as to her condition is received. If the plane down is the flag, orders will be awaited as to which plane, if any, shall land and take aboard the division commander in case flag will not be able to resume flight.

Sharp spirals and steep banks are forbidden. In making landing it is desirable to approach the water on the course into the wind.

On approaching a port of predetermined landing point, the flag seaplane will ordinarily leave formation approximately 5 miles from destination and will maneuver as necessary to make landing. Other machines shall maneuver independently until the flag seaplane has landed, when they will proceed to make landings in succession in their order in formation and landing in the same area. After landing planes shall maneuver at slow speed to their moorings if these have been previously designated; if not, they shall maneuver clear of all shipping and await orders from the flag seaplane or base ship. After mooring, commanding officers shall report aboard the base ship unless orders to the contrary are received.

In signaling courses between planes or to destroyers, course will always be true course, unless otherwise specifically designated. "*True*" *course* will mean compass course corrected for compass deviation and for variation, but *not* corrected for drift. "*Course made good*" will be used to designate "true" course *corrected for drift.*



NC-3 AT PONTA DELGADA, SHOWING RIPPED FABRIC ON LOWER LEFT WING.

Official photograph, United States Naval Air Service.

FLYING BOAT F–5L—ENDURANCE FLIGHT.

Source: Reliable.

28 April 1919.

On Friday morning at 11.42 an endurance test was commenced on *F–5L* seaplane No. 3589. Preparations as follows had been made for this flight: Extra gas tanks and gas manifold valves had been installed, bringing the total gas capacity of the plane up to 966 gallons. Additional lubricating oil tanks were installed for each motor, giving a capacity of 40 gallons per motor. Five gallons of extra fresh water was carried in the machine and was supplied through copper pipes by hand pumping and two-way valve system. The plane was equipped with two standard Navy low-compression motors rebuilt with high-compression pistons, and carburetor adjustments as follows: Choke, 30; main jet, 135; compensator, 155. Matthews' *F–5L* sticks were installed.

The plane, on taking off, carried approximately 900 gallons of gas, 65 gallons of oil, 5 gallons of water extra and four pilots, as follows: Ensigns H. S. Souther, Rutledge Irvine, DeLos Thomas, and myself, the plan being that the pilots would stand watch alternating their duties as pilots, second pilot, and engineer. Ensigns Souther and Irvine were in the pilot's seat taking off, Ensign Thomas and myself acting as mechanics. Weather conditions were fair, there being a wind of about 15 knots from the westward. The plane got off in 65 seconds with very little difficulty and the flight commenced. The weight of the plane on taking off was approximately 16,200 pounds total. The air was extremely bumpy, and it was with the greatest difficulty that two pilots, working short interval shifts, were able to fly. After about four hours of flying pilots were changed. No particular effort was made to set a definite course to be followed. The plane was flown to the mouth of the Potomac, across Chesapeake Bay, down to the Capes and back to the Hampton Roads air station, and this route repeated continually. At 6 o'clock weather conditions were so bad due to the increase of wind to approximately 35 knots, and the difficulty experienced in flying, due to severe bumps, was so great that it was decided to go down if conditions did not improve. At nightfall Ensigns Thomas and Irvine took the controls and it was then decided to attempt to keep up during the night. A strong wind and the bumps continued and flying was very difficult. Ensigns Thomas and Irvine found it necessary to alternate at the controls approximately every 20 minutes throughout the night. It was not deemed advisable in the darkness to attempt shifting positions in the plane. At about 11 p. m. the fourth cylinder of the right bank of the port motor burned out its valve. This, however, did not stop the flight, only necessitating a little more throttle on that motor

to maintain the revolutions. At daybreak Ensign Souther and myself again took the controls and alternated at the wheel from that time until landing was made at 7.52 a. m., having been in the air then 20 hours and 10 minutes.

Gas Consumption.

The plane started with approximately 900 gallons of gas and flew 20 hours and 10 minutes. It is the opinion of all the pilots that much better fuel economy could have been obtained if weather conditions permitted flying with less throttle. The high winds and dangerous bumps required excess flying speed to maintain control of the machine. The loss of one of the cylinders from the port motor also increased our fuel consumption slightly, and it is believed that under more favorable weather conditions the plane is good for approximately 25 hours. It is my intention to repeat the test in the near future under more favorable weather conditions.

Oil Consumption.

At the end of the run it was found that only about 32 gallons of oil had been used by motors. The oil and lubricating systems were in good condition at the finish of the run.

Water Consumption.

The motors did not heat up excessively at any time during the run, and although extra water was pumped into the radiators as a test of the system, it was not necessary and nearly resulted in overflowing the radiators. The highest temperature attained throughout the run was 183° on the port motor. The starboard motor ran continually at a temperature of about 150°.

Motors.

On taking off, 1,530 revolutions were required from the motors. As soon as sufficient altitude was obtained, approximately 250 feet, the motors were throttled to 1,480, and from this time on until the finish of the flight they were slightly throttled down as the load diminished, turning over at approximately 1,260 when the landing was made. No motor trouble whatever developed throughout the run with the exception of the one cylinder referred to in the port motor.

The Plane.

There was nothing exceptional to report on the plane. It withstood the extra load satisfactorily, and is in good condition at the present time. It was extremely heavy on the controls, due to the weather conditions. The plane was equipped with an interior lighting system throughout, which drew its current from the ignition bat-

teries, and which worked very satisfactorily. The plane was also equipped with Holt's landing flare on the nose for emergency use.

Personnel.

The entire personnel was under severe strain throughout the flight, due to the extremely dangerous weather conditions and to the fact that it was impossible for anyone to take time for rest. Had the gas supply been sufficient everyone felt that the flight could have been continued for several hours longer in order to better the record. It was the consensus of opinion of all pilots in the plane that it was, without a doubt, the bumpiest weather that any of them had ever experienced. Exceptional credit is due to the three ensigns in the plane. Ensigns Thomas and Irvine flew continuously from 6 o'clock at night until 6 o'clock in the morning under adverse conditions, and at times both pilots were required on the controls to keep the machine right. Ensign Souther spent 12 hours' continuous watch as mechanic and during this time did not devote any time whatever to rest, but worked continually in the engineer's cockpit, and it is my opinion that the success of the flight is due to the untiring efforts of these three officers.

GERMAN TORPEDO CARRIERS.

Source: Reliable.

December 1918.

(11656.)

The use of seaplanes for torpedo work has been discontinued for a long time past, the machines being converted for long distance reconnoissance work, and no attempt has been made to use aeroplanes for such operations. It was explained that while some success was achieved in the early stages, as the armament and the gunnery of merchant ships improved, the work became exceedingly hazardous owing to the conditions of attack more or less straight toward the ship, and a dive, followed by flattening out on releasing the torpedo.

The torpedo was usually dropped when only a few meters from the water, and at a distance of about 400 meters from the target. The torpedo used was the 450 mm., and it was housed within a hemispherical recess in the bottom of the fuselage. The seaplanes used were all twin-engined, and were manufactured by Hansa and Brandenburg; by the Gotha Waggonfabrik, and by the Friedrichshafener Co.

No seaplanes were seen in a condition for carrying torpedoes, except one at Norderney, which had been adapted for carrying bombs. The torpedo-dropping gear consisted of two semicircular clips hinged

on one side and fitted with a quick-release mechanism somewhat similar to that used in the present standard bomb-dropping gear on aeroplanes on the free end. The design was quite simple and was said to act perfectly satisfactory, although no special means could be discerned to insure that the two clips would be released correctly.

Pilots were not at all keen upon the torpedo carrier, as the seaplane itself must necessarily be large in order to carry it, and the additional weight of the torpedo itself made the machine slow in speed and climb and difficult and tiring to handle in the air. This, together with the fact that the possibility of being brought down by gunfire was great, accounted for its discontinuance in 1917.

None of the officers with whom the subject was discussed had had any experience with such machines, and such information as was imparted was obtained in conversation. They could give no particulars as to difficulties experienced in the early stages of its development and how they were overcome.

So far as could be discovered, there had been no experiments carried out with torpedo-carrying aeroplanes, neither had any attempt been made to fly off or land on the deck of a ship. They were well aware of the fact that such work had been done in this country, but the general impression conveyed by the conversation of the two officers was that any work that entailed more than the normal risks associated with war flying was not justifiable.

RECONNAISSANCE FLIGHT AT COCO-SOLO, C. Z.

Source: Weekly Report of Aviation.

5 May 1919.

On Friday the weekly reconnaissance flight was made down the Panaman coast to the town of Nombre di Dios, the commanding officer in charge of the expedition. A heavy surf was running in the bay, and one of the machines was badly damaged, rudder and right aileron being carried away. The boat then became unmanageable, and in attempting to gain the shore ran on a submerged coral reef and damaged the hull. A pigeon was then released with a message informing the station of the conditions and requesting that spare rudder and aileron be dispatched by plane. Later two planes returned to the station and found that the pigeon had returned with its message, and an *HS–2L* was being made ready for the flight. The rudder and two ailerons were strapped along the lower wing sections, and although the boat got away safely, the lifting effect was reduced to such an extent that an altitude of only 150 feet could be obtained. However, the flight was made successfully and the spare part delivered.

The damaged boat was repaired and attempted to get away, but water was taken in faster then it could be pumped out, and it was forced to return to the beach. Another pigeon was immediately dispatched, informing the commanding officer of conditions. Upon the arrival of the pigeon a subchaser and a wrecking and repair crew with handling trucks and a stump puller were dispatched, with orders to haul the boat out on the beach and repair the hull. This was effected without a great deal of difficulty with the use of the "K" stump puller, by which means a load of 40 tons can be hauled by two men. The hull was then repaired, and the boat returned to the station without further trouble.

BRITISH AIR ESTIMATE.

Source: Reliable.

29 May 1919.

(11678)

The total appropriation for British Air Service for the year beginning April 1, 1919, was £65,000,000. This figure includes the appropriation for military and commercial aviation. There are no definite figures obtainable at present as to peace complement of personnel.

120800—19——2

OPERATIONS.

MANEUVERS AT CAPE MAY, N. J.—AIR AND SURFACE CRAFT WITH U. S. S. *0—5*.

Source: Letter from Commandant, Fourth Naval District, Submitting Reports from Naval Air Station, Cape May, N. J.

15 April 1919.

The results of the following problem are published for information of the service as it is considered to be of particular interest, especially so after the operations of the German submarines off our coast during the war.

PROBLEM IV.

Submarine will operate between the latitudes of Atlantic City and Fenwick Shoal Lightship for a period of three or four days, simulating the method of hostile submarine operating off the coast.

When a merchant vessel is encountered which the commanding officer of submarine would consider a good object to destroy, he will approach within the range necessary for gunfire or torpedo, whichever would be most suitable and radio in his position. If the assumption is that the submarine could have fired a torpedo, the submarine will remain on the surface 5 minutes after radio message is sent and then make getaway. If an attack by gunfire is assumed, the submarine will remain on surface 15 minutes before making escape. These attacks will be made by the submarine with the view of eluding patrols.

If possible, once each day, the submarine will remain on the surface near a schooner for one hour, to simulate condition of submarine searching a schooner, not fitted with radio, for provisions. In this case no radio message will be sent. However on sighting seaplanes or patrol vessels approaching, submarine will attempt to escape by diving.

Each day between 1 and 2 p. m., submarine will come to surface and send test (radio) for three minutes and sign off, repeating three times at three-minute intervals. Use 600-meter wave length. After sending these signals on first day submarine will cruise on surface for two hours or less, if located by seaplanes. On second day after sending signals, cruise with conning tower showing and third day with only periscope showing (during the two-hour intervals).

This problem will if practicable be continued until three flying days have been obtained. Submarine will be informed each day by radio at 7 a. m. whether or not exercise can be carried out for the day; also again at noon.

Throughout first day submarine will operate running on surface or with periscope showing. On approach of seaplanes or subchasers she may dive or do whatever may be necessary to elude the patrol.

On remaining days, except as limited above, submarine may operate as commanding officer thinks best, to elude patrols.

Subchasers will operate as directed from day to day.

Submarine will be attacked when sighted and if submerged with periscope showing, two miniature bombs will be dropped.

Submarine will remain outside first night and at 9 p. m. will send test (radio) for three minutes and sign off, repeating three times at three-minute intervals. Submarine will remain on surface. Upon location being obtained by radio compass subchasers will proceed to locate submarine. Submarine will be prepared to fire Very pistols or turn on light when necessary to avoid being run down.

Submarine will remain darkened unless such need of lights occur.

Upon being located all hands return to base.

Campaign Order No. 4.

FORCES.

(*a*) *Seaplane patrol, Lieut. Berger.* Squadrons, One to two.
(*b*) *Auxiliary patrol, Lieut. Little.* Z—Twenty-three.
(*c*) *Emergency patrol, Ensign Adamson.* Squadron, Three.
(*d*) *Base guard, Ensign Edwards.* Subchaser Division.

1. A hostile submarine is operating off Cape May.
2. This force will locate and destroy hostile submarine.
3. (*a*) *Seaplane patrol.*—This force will maintain a patrol off Cape May.
   (*b*) *Auxiliary patrol.*—This force will assist seaplane patrol.
   (*c*) *Emergency patrol.*—This force will be prepared to answer S O S messages.
   (*d*) *Base guard.*—This force will maintain a patrol off Cape May.
   (*x*) Rendezvous, Cape May. Seventy-fifth time.
4. Aircraft Signal Book. Wave length, 300.

(Sgd.) R. R. Paunack,
Lieutenant Commander, Commanding.

PROBLEM IV (First Day).

Report of Squadron I.

7 APRIL, 1919.

Heavy fog prevented operations in forenoon.

(Sgd.) CHARLES H. ADAMS,
Squadron Commander.

Report of Squadron II.

7 APRIL, 1919.

2 p. m. Squadron underway on northern and southern patrols.

3.20 p. m. A–1212 returned to station on account motor troubles.

6.20 p. m. Squadron returned to station.

No trace of submarine was seen by regular patrol. Very hazy; visibility, 4 miles.

(Sgd.) JOHN MONTGOMERY,
Squadron Commander.

Report of emergency patrol.

7 APRIL, 1919.

4.20 p. m. Position of submarine, obtained by radio compass, 12 miles 110° (true) from air station.

4.23 p. m. Emergency patrol underway.

4.30 p. m. Emergency patrol (5 seaplanes) in air.

6.00 p. m. Seaplanes Nos. *2257*, *1667*, and *2245* sighted submarine coming to surface.

6.05 p. m. Seaplanes directed subchasers to position of submarine.

6.20 p. m. Returned to station.

Very hazy; visibility, 4 miles.

(Sgd.) PAUL E. SHUMWAY,
Emergency Patrol Commander.

Report of "Z–23."

7 APRIL 1919.

1.35 p. m. *Z–23* under way.

2.35 p. m. *Z–23* landed account of trouble with oiling system.

2.50 p. m. *Z–23* under way.

4.15 p. m. S O S intercepted but position not given.

6.42 p. m. Landed at station.

(Sgd.) C. G. LITTLE,
Dirigible Officer.

Report of subchaser division.

2.00 p. m. Shoved off from marine dock and proceeded to sea in column formation.

2.10 p. m. Passed bell buoy abeam, Cold Spring Inlet.

2.25 p. m. Formed line of bearing, rear boats right oblique 123 (T).

2.42 p. m. *SC No. 73* and *No. 74* stopped, using listeners.

2.55 p. m. Got under way, course 123 (T).
3.20 p. m. *SC No. 73* and *No. 74* stopped, using listeners.
3.28 p. m. Under way, course 123 (T).
3.50 p. m. Stopped; listeners at work.
3.59 p. m. Under way, course 123 (T).
4.00 p. m. *SC No. 73* blew out manifold, returning to base.
4.10 p. m. Passed Five Fathom Lightship abeam.
4.12 p. m. Formed column, course 20° (true).
4.15 p. m. Formed line of bearing, course 20° (true) speed 10 knots.
4.56 p. m. Ships left 45°.
5.30 p. m. Ships right about—seaplanes evidently directly over submarine.
5.55 p. m. Sighted submarine broad on starboard bow, changed course and headed for it.
6.02 p. m. Alongside submarine.
6.05 p. m. Formed column, returning to base.
6.10 p. m. Passed Northeast and East End Lightship abeam, course 264° (true).
7.40 p. m. Jetty light beam.
7.50 p. m. Tied up alongside *SC No. 73* at marine dock.
10.20 p. m. Shoved off from marine dock and formed column.
10.30 p. m. Jetty light abeam changed course 123° (true).
10.45 p. m. Formed line of bearing.
11.20 p. m. *SC No. 429* returning to base, man on board badly hurt.
11.45 p. m. Located submarine 280° (true) from Five Fathom.
11.58 p. m. Returning to base, course 303° (true).
April 8, 1919.
1.15 a. m. Jetty light abeam.
1.27 a. m. Tied up alongside *SC No. 427* at marine dock.

(Sgd.) E. W. Edwards,
Ensign (T), United States Navy.

Report of U. S. S. "O–5."

12.15 p. m. Under way to position 3 miles from Northeast End Lightship bearing 21° (true).
2.50 p. m. Submerged to check trim and balance.
3.26 p. m. On surface.
3.50 p. m. Sighted three subchasers bearing south distant 4 miles. Submarine position 4 miles from Northeast End Lightship bearing 21° (true).
4.00 p. m. Sent test radio and secured for dive. Subchasers in sight heading toward us.
4.23 p. m. Submerged on course 20° (true). Ran at periscope depth, speed 3 knots.
4.25 p. m. Picked up subchasers on starboard quarter on parallel course.

4.55 p. m. Sighted seaplane bearing 290° (true) distant 5 miles.

5.10 p. m. Subchasers passed abeam to eastward in line, nearest subchaser 1,500 yards. Seaplanes skirting formation.

5.12 p. m. C. C. to 200° (true).

5.50 p. m. Came to surface as no hostile craft was in sight. Was immediately sighted by seaplanes and later by subchasers.

Remarks.

Position of initial submergence selected at random. Initial course down wind to make least periscope feather. Changed course when subchasers were abeam in order to get near traffic during maneuver to drown out listening gear on subchasers. Came to surface when certain I could have escaped by remaining submerged.

7.46 p. m. Anchored 2¾ miles on bearing 126° (true) from Five Fathom Bank Lightship.

9.00 p. m. Sent test radio—ship dark.

11.15 p. m. Sighted four subchasers.

11.48 p. m. Was located by subchasers. Weather clear. Sea calm.

(Sgd.) B. KILLMASTER,
Submarine Commander.

PROBLEM IV (Second Day).

8 APRIL 1919.

Report of Squadron I.

8.50 a. m. Northern patrol underway (2 seaplanes).

9.05 a. m. Passed *Z–23* 6 miles east of Wildwood.

10.06 a. m. Passed over Northeast End Lightship.

10.23 a. m. Sighted submarine with conning tower awash heading toward a steamer 2½ miles 85° from Northeast End Lightship.

10.27 a. m. Attacked submarine. Dropped two bombs. Radical position of submarine to other seaplane, which attacked and dropped two bombs where submarine had submerged.

10.46 a. m. Received radio from *A–2255* that all seaplanes had been recalled to station.

11.13 a. m. Returned to station.

Remarks.

Wind velocity 40 to 45 miles per hour. Radio communication between seaplanes was excellent. Bombs dropped would have been effective.

(Sgd.) CHARLES H. ADAMS,
Commander Squadron I.

Report of Squadron II.

8 APRIL 1919.

No operations in afternoon account of high wind.

(Sgd.) JOHN MONTGOMERY,
Commander Squadron II.

Report of "Z–23."

8 April 1919.

8.25 a. m. Under way on patrol.

9.30 a. m. Recalled by radio.

9.50 a. m. Landed at station.

At about 9.20 wind rapidly increased so that ship could make practically no headway. Wind was blowing 46 miles per hour when landing was effected.

(Sgd.) C. G. Little,
Dirigible Officer.

8 April 1919.

Report of emergency patrol.

9.00 a. m. S O S Position 16–09–79.

9.20 a. m. Emergency patrol (6 seaplanes) under way.

9.44 a. m. Recall received by radio by flag boat. Returned to station.

Shortly after leaving station wind rapidly increased until it was blowing 50 miles per hour.

(Sgd.) Paul E. Shumway,
Commander Emergency Patrol.

Report of Sub-Chaser Division.

8 April 1919.

Stood by at ease.

(Sgd.) E. W. Edwards,
Commander Sub-Chaser Division.

Report of U. S. S. "O–5."

8 April 1919.

8.12 a. m. Gunned steamer 2 miles northeast of Five Fathom Bank Lightship. Radioed position. Steamed on surface at 9 knots course 46° (true) until 9.25 a. m.

9.25 a. m. Submerged 5 miles northeast of Five Fathom Bank Lightship on course North (true).

10.25 a. m. Having sighted no pursuit, came to surface with intention of gunning steamer 2 miles east of Northeast End Lightship.

10.27 a. m. On opening conning tower hatch, sighted seaplane 240° (true) distant 2½ miles.

10.29 a. m. Submerged to 55 feet and C. C. to 90° (true). Certain we were seen by seaplane. Ran at speed of 3.4 knots.

1.00 p. m. Came to surface and sent test radio. Lay on surface. Headed to Northeast End Lightship.

4.05 p. m. Gunned steamer at Northeast End Lightship and sent in position.

5.05 p. m. No pursuit in sight headed toward base.

Remarks.

Weather slightly hazy. Sea calm, very little wind. When sighted by seaplane, ran east to get deep water. Ran deep to keep below traffic and because periscope feather would have been easily picked up. Slow speed; submerged to conserve battery and when at periscope depth to reduce feather and wake.

(Sgd.) B. KILLMASTER,
Cammander Submarine.

PROBLEM IV (Third Day).

9 APRIL 1919.

Report of Squadron I.

1.35 p.m. Southern patrol underway (2 seaplanes).

4.35 p. m. Southern patrol returned.

(Sgd.) W. J. LEISENRING,
Commander Squadron I.

Report of Squadron II.

9.00 a. m. Southern patrol underway (2 seaplanes).

9.11 a. m. Northern patrol underway (2 seaplanes).

10.11 a. m. Northern partol sights periscope 1 mile east of Northeast End Lightship.

10.14 a. m. Northern patrol attacked submarine which was submerging. Dropped two bombs, one of which landed within 30 feet of submarine.

12 a. m. Patrols returned to station.

Remarks.

Light southerly wind. Visibility poor. Sea smooth.

(Sgd.) JOHN MONTGOMERY,
Commander Squadron II.

Report of "Z–23."

9 APRIL 1919.

1.45 p. m. Underway on patrol.

5.20 p. m. Submarine sighted in 16–03 on surface standing in to inlet.

5.55 p. m. Landed at station.

(Sgd.) C. G. LITTLE,
Dirigible Officer.

Report of Emergency Patrol.

9.58 a. m. S O S position 16–04–17.

10.52 a. m. Emergency patrol (4 seaplanes) underway.

10.32 a. m. Passed steamer which had been attacked.

11.30 a. m. Sighted S. C. boats heading west by south.

1.00 p. m. Returned to station. Did not locate submarine.

(Sgd.) PAUL E. SHUMWAY,
Commander Emergency Patrol.

Report of Sub-Chaser Division.

9 April 1919.

10.00 a. m. Underway. Speed, 10 knots.

11.40 a. m. Northeast End Lightship bearing 5° (true), distant, 4 miles.

12.40 a. m. Ships left 45° course 59° (true), speed, 12 knots.

1.00 p. m. Formed column, course 59° (true).

1.20 p. m. Ships left 15°.

1.50 p. m. Ships left 90°.

3.45 p. m. Formed column course 192° (true).

3.55 p. m. Formed line, course 192° (true), speed, 13 knots.

5.15 p. m. Northeast End Lightship abeam C. C. to 200° (true).

6.03 p. m. Five Fathom Lightship abeam C. C. to 203° (true).

6.40 p. m. Formed column.

8.25 p. m. Returned to base.

(Sgd.) E. W. Edwards,
Division Commander.

Report of U. S. S. "O–5."

9 April 1919.

6.30 a. m. Underway.

9.15 a. m. Gunned steamer at Northeast End Lightship and sent in position.

10.17 a. m. Sighted and was sighted by seaplanes 1 mile to eastward.

10.18 a. m. Submerged on course 200° (true), and when 40-foot depth was obtained C. C. to 90° (true).

10.28 a. m. Changed depth to 50 feet. Lay on bottom until 10.40 a. m.

10.40 a. m. Ran at 45 feet speed 3.4 knots.

12.15 p. m. Rose to periscope depth and changed course to north (true).

12.21 p. m. Sighted seaplane bearing northeast; distant 2 miles. Our position 7.2 miles east of Northeast End Lightship. Seaplane may have seen us. Dove to 55 feet and changed course to east, speed 3.4 knots.

1.15 p. m. Came to periscope depth and changed course to north. No pursuit in sight.

1.25 p. m. Came to surface and sent test radio. Position 10 miles east of Northeast End Lightship.

2.30 p. m. Underway on surface. Proceeded to Northeast End Lightship.

3.30 p. m. Torpedoed steamer. Radioed position.

4.05 p. m. Submerged to periscope depth.

4.45 p. m. No pursuit in sight; came to surface.

Remarks.

Sea smooth and oily; slightly hazy. Poor day for submarine work. Change of course and deep running necessary to throw off pursuit.

(Sgd.) B. KILLMASTER,
Commander Submarine.

Radio.

Communication between seaplanes was reasonably good. Radio communication with station was not good. This was to a great extent due to the necessity of carrying on commercial work during maneuvers. The S O S sent by submarine at 3.30 p. m. was never received.

Accurate positions were obtained by radio compass, but considerable time was required to get the bearing from Lewes. Also inaccuracies resulted in transmission to air station of position obtained.

Comments.

Execution of problem was fairly good. Submarine did not operate as cautiously as would be the case in war, owing to conditions of the problem. Although submarine was frequently located, opportunities for successful attack were rare. Submarine could have done considerable damage to shipping. Results indicated, as did operations during the war, the small chance for seaplanes to actually destroy submarines operating singly.

RESULTS OF PROBLEMS.

1. *Problem No. 4.*—This problem demonstrated the value of the radio compass. It further proved the ability of the submarine to operate almost at will, in any area, and to attack any shipping that is not convoyed. In addition, it adds weight to the theory that patrol and search by aircraft for submarines is not efficient, and that whenever possible available aircraft should be used in convoy work, rather than patrols.

2. The following general comments are derived from the study of the different problems:

(*a*) The campaign orders of the seaplane squadrons and of the submarine chaser boat squadron are incomplete and omit the necessary information relative to formation procedure and tactics.

(*b*) The squadron commanders, commanding officers, and pilots apparently have not made a proper study of the different problems, with special reference to the probable action of submarines under different conditions. This was due, it is believed, to lack of proper training, unfamiliarity with scouting methods, tactics, and lack of standardization of training at the different air stations and bases. In general, there existed a lack of doctrine.

(*c*) It is recommended that, using Commander Pye's book "The Service of Information and Security," in so far as it is applicable as a guide, a system of lectures and study be instituted immediately and made a part of the training for submarine chaser boat officers and seaplane pilots at all stations and bases.

(*d*) The present system of interplane communication, at least in this type of aircraft, is not satisfactory. Extensive experiments should be made, not only in radio apparatus, but in visual signals. It is of vital importance that the aircraft which discovers the submarine should be able, under any and all conditions, to communicate at once with other aircraft, with surface craft, and with the shore base.

3. It is believed that the above problems have demonstrated certain facts, some of which have been undoubtedly established under war conditions, and all of which should be used in plans for future training and operations. The following deductions are made, after study and analysis of the problems:

(*a*) When a submarine is supposed to be in certain area and it is desired to protect some stationary goal, such as a light vessel, a battleship at anchor, a harbor entrance, etc., the best defense other than nets and mines is the greatest possible number of surface craft, equipped with listening devices. In this case, where a submarine may pick its time and method of attack, aircraft patrol is almost valueless.

(*b*) When a submarine is operating off the coast in coastwise shipping routes, ordinary patrols and search by aircraft are of little value. It is unquestionably better to place all possible shipping under convoy, either surface and aircraft combined, or aircraft alone, if surface craft are not available. It is believed that the use of every available aircraft to convoy shipping, through the limits of each district, would be a better submarine defense than any possible patrol.

4. It is considered that the problems were worked out satisfactorily, and that the operation of the aircraft was commendable.

5. The problems prove of great interest to everyone concerned and will undoubtedly be of the highest benefit to seaplane pilots and S. C. boat officers. It is requested that whenever opportunity permits a submarine be detailed to this district for exactly this sort of work, for it is believed that the highly beneficial, practical experience can be gained in no other way.

CONSTRUCTION AND REPAIR.

CONVERSION OF MERCHANT SHIPS INTO AUXILIARY AND TROOP SHIPS.

Source: Commander Cruiser and Transport Force.

21 May 1919.

(21056/578.)

CONSTRUCTION.

It has been found that practically all merchant vessels are constructed along the same lines; that is, they are divided into water-tight subdivisions by transverse bulkheads extending to the bulkhead deck, which is a water-tight fore and aft deck above the load water line. Practically all 'tween-deck spaces can be used for the erection of standees, or the installation of the necessary facilities to carry troops. There is no essential difference in the construction between passenger-carrying and cargo-type vessels. Passenger vessels have greater speed, more decks, and have cabin appointments for carrying passengers. This provides for galley facilities, toilets, etc., but these facilities are inadequate if the vessel is used to her maximum capacity for carrying troops. On passenger-carrying vessels it has been the practice to rip out the second and third class staterooms to increase the troop-carrying capacity, leaving sufficient staterooms to accommodate one officer for 20 troops. Vessels of the cargo type have insufficient galley and latrine facilities and also require additional officers' quarters. The port facilities of New York can accommodate efficiently 15 to 20 vessels under conversion.

TONNAGE.

During the war the tonnage of the vessels utilized by this force for the transportation of troops varied from 5,159 to 54,282 tons gross. It can not be said that the tonnage would affect the use of the vessel as a troop transport. Practically any vessel intended for deep-sea voyages can be utilized as a troop transport.

CRUISING RADIUS.

Practically all vessels of a merchant type are constructed for a definite purpose; that is, operation between given points, and their

bunker capacity is provided accordingly. On all vessels, except a very few of the passenger-carrying type operated by this force, it was found possible to give them a cruising radius of 8,000 miles or greater by using main bunkers, reserve bunkers, and in a number of cases the hold spaces. The most notable case of this kind was the *Lenape*, which was constructed for coastwise work with a bunker capacity of 475 tons. When employed as a troop transport, she carried 1,525 tons in her holds in order to enable her to make a round trip to Europe without coal. Oil-burning vessels constructed for coastwise work, such as the U. S. S. *Northern Pacific* and U. S. S. *Great Northern*, required additional oil tanks to give reasonable cruising radius. This will materially increase the conversion period.

SPEED.

Experience during the war demonstrated that a speed of not less than 14 knots was almost mandatory to operate the vessels efficiently in a troopship convoy. Passenger-type vessels constructed within the past 15 years usually have a speed of 14 knots or greater, and the cargo type are usually less than 14 knots.

It may be stated that vessels of the passenger-carrying type may be more quickly converted into troop transports than vessels of the cargo type, and are in every respect more suitable for the transportation of troops. The time required for conversion, in the port of New York, has varied from 10 to 30 days. Practically no structural changes are necessary, the principal work being installation of standees, latrines, urinals, wash rooms, galley, hospital, storerooms, mess hall, etc. The standard accommodations for officers were 5 per cent of the troop capacity. It was usual to use all 'tween deck spaces for carrying troops or troop facilities above enumerated. Hold spaces were utilized for the transportation of cargo.

As stated above, cargo vessels may be used, but the conversion of these vessels is considerably more involved, since it usually requires installation of more facilities, such as Army officer's quarters, ice machine, additional generators, etc. Cargo vessels are as a rule not ventilated, but the first (1) and second (2) 'tween deck spaces can usually be utilized for troops without providing artificial ventilation. The average conversion period for a cargo vessel to give the maximum number of troops would vary from 30 to 50 days, depending upon the facilities at hand.

An analysis of the tonnage employed by the British as compared with the tonnage employed by this Force at the time of the maximum troop movement during 1918, shows each troop transported by this Force required about one-half as many gross tons as the British required for the transportation of troops. To utilize any vessel to its maximum efficiency for the transportation of troops, it

is necessary that considerable alterations be made and, as stated above, these alterations required from 10 to 30 days for passenger-carrying type and from 30 to 50 days for cargo-carrying type vessels.

From an initial troop movement without conversion it is probable than an enemy would carry about two-thirds the number carried on our vessels of the passenger-carrying type, and about one-third to one-half the number carried on the cargo-vessel type. For short voyages, of say six to eight days, if the enemy had control of the sea, it is probable that he would adopt the "turn in and turn out method," that is, two troops would be assigned to each berth installed, and berthing, messing, etc., would be carried on by watches. Approximately twice the number of troops could be carried by using this method, which was tried out during the war on the *Agamemnon*, *Mt. Vernon*, and *Von Steuben*, but due to the submarine activities, lack of ocean escort, and other reasons, the War Department objected and the scheme was abandoned. However, it was proved to be perfectly feasible, and it could be easily adopted, particularly for fast vessels. It is understood that the Germans intended to utilize the U. S. S. *Leviathan* for an attack on England to transport 20,000 troops.

COMMUNICATIONS.

COMMUNICATION SYSTEM OF JAPAN.

Source: Reliable.

15 May 1919.

(11647.)

The following is a brief summary of the communication system of Japan.

There are 19,600 miles of open wire pole line and 21 miles of underground conduit, with 103,000 miles of aerial wire and 2,000 miles of underground-cable conductors. In addition there are about 6 miles of pneumatic tubes used for postal service and for the transmission of written messages in carriers underground. These telegraph lines connect the principal cities of the islands with the landing points of the cables and with the radio stations, as well as furnishing interior communication on the islands. They are worked largely on the European system or have been until recently. About four years ago a number of Japanese engineers visited the United States and made a detailed investigation and a thorough study of the telegraph system of the Western Union Telegraph Co. and it is understood that orders have since been placed with the Western Electric Co. for automatic apparatus similar to that in use in the United States.

The length of the lines and the number of wires on them indicate that communication is confined largely to the principal centers and that there is no comprehensive distributing system of telegraph over the islands. Japan has a smaller mileage of telegraph lines than Mexico and the reputation of the Japanese for distribution of communications is very poor.

In regard to cables, the Japanese Government owns and operates 144 distinct submarine cables, not including 23 miles of river cable. The mileage of the submarine cables is 4,260 nautical miles, and the mileage of the conductors is 5,100. The latest cable to be laid is from Sasebo to Port Arthur. The only foreign-owned cables in Japan are those of the Great Northern Co., a British concern, which extends from Nagasaki to Shanghai and from Nagasaki to Vladivostok.

There are two cables to Vladivostok, each about 250 miles long. There are two cables from Shanghai to Nagasaki, each about 430 miles long.

The Japanese Government has two cable ships, one of 2,300 tons, stationed at Yokohama; and one of 1,500 tons, stationed at Nagasaki. The latter-named ship is comparatively new. In addition to these the Great Northern Co. has two ships whose home port is Shanghai. These are available for the repair of Japanese Government cables on the request of that Government.

As far as is known there is no factory for the making of submarine cable in Japan; and, in fact, I have never heard of any factory of any size in any place in the Orient. Great Britain has a virtual monopoly of the manufacture of cable, although Germany had two modern factories, France two, and Italy one, before the war.

The administration of the Japanese cable is notoriously poor, the only other places in the world where service is equally unreliable being Haiti and Porto Rico. At the present time cable messages to and from Japan are delayed four and one-half days, two and one-half days of which are at the Japanese end. The Commercial Pacific cable between Guam and the Philippines is broken at this date and the only method of communication is by radio. To reach the Philippines and China by way of Japan means an indefinite delay, amounting probably from 15 to 30 days.

The most important thing in the Japanese cable so far as the United States is concerned is the section between Yokohama and Bonin Islands, which is one of the Ogasawara group. This particular section of cable limits the speed of the entire cable route to Japan. In cases when the connection between Guam and Manila is broken, as at present, this cable will accept only official Japanese Government and United States Government messages, and there is reason for believing that a great many Japanese commercial messages are sent under the guise of official Japanese Government cablegrams.

The radio communications of Japan consist of 14 stations, 10 of which are small short stations with a power plant rating below 20 kilowatts. Three others, located at Chosi, Otchishi, and Osozaki, range from 20 to 50 kilowatts each. There is only one high-power radio station in Japan and this is at Funahashi, near Tokyo. This is a modern plant with a 350-kilowatt set. The volume of business handled by radio is very small compared to that of any European nation.

RADIO EQUIPMENT OF GERMAN SEAPLANES.

Source: Reliable.

December 1918.

(11656.)

All wireless apparatus is located in the observer's compartment on two-seaters. This is just abaft the pilot's compartment. Damped wave apparatus is used throughout.

Alternator.

The alternator is wind driven and is made fast to a bracket outside the fuselage on the starboard side and just abreast the observer. It is so mounted that it may be rotated about a vertical axis through an arc of 90 degrees. The generator may be given any one of five positions, i. e., the shaft in one position is parallel to the fore-and-aft line of the fuselage, and in the other four varies, the last being 90 degrees from the fore-and-aft line. It cannot be swung into the fuselage. The machine has a frequency of 534 cycles at a speed of 3,400 revolutions per minute. Its output is about 300 watts. The weight is about 12 pounds. It has a stream-line body but is rather short. The generator leads that pass through the hull to the transmitter are armored.

Transmitter.

The transmitting apparatus is entirely inclosed in a wooden box about 10 inches square by 8 inches deep. There are no instruments on this transmitter box. This box is made rigidly fast to the forward bulkhead of the observer's compartment. No attempt has been made to supply an elastic suspension. The box has plugs for four wave lengths: 300, 400, 450, and 600. There is no means of tuning the transmitter when in the air other than varying the length of antenna wire. To change the tune the plug would be shifted to the proper socket and the antenna length varied for maximum radiation. The antenna ammeter has a scale of 4.5 amperes. The usual radiation obtained is 3.5 to 4 amperes.

The distance covered from seaplane to shore is said to be 200 kilometers. No information could be obtained as to the distance covered between seaplanes. The receiver detectors, amplifier, and send-receive switch (*transfer switch*) are all made fast to a board cut to fit in the seaplane. They are rigidly connected to this board and the board rigidly attached to the forward bulkhead of the observer's compartment.

Receiver.

This instrument is about a 6-inch cube. There are four sockets marked 300, 400, 450, 600, and a plug with a flexible head to make the change in wave length. The fine tuning is done by a single variable condenser.

Detectors.

Crystal detectors are used throughout and the detectors are inclosed in the usual Telefunken fashion. Three detectors are used on each plane, with a simple switch for throwing to any one of them.

Amplifier.

A two-stage amplifier about 6 inches square and 3 inches deep is used. It is very similar in outward appearance to the amplifier found on the U-boats. There are no instruments on the box.

Switch.

There was nothing novel about the send-receive switch. It looked rather bulky.

Antenna System.

The antenna passes out the port side of the fuselage through a porcelain insulator located just aft of the forward bulkhead of the observer's compartment; from this insulator it passes aft along the side of the fuselage and about 3 inches from it to a point just abaft the observer's seat, where it enters the hull through the same type insulator. Outside the hull the lead is a copper tube a little more than one-fourth inch in diameter.

The antenna reel of black insulating material is on the starboard side abaft the observer's seat; the observer can reach it easily. The reel will carry about 500 or 600 feet of wire. The lead out is through a hole in the bottom of the fuselage on the starboard side and well enough aft to clear the pontoons. The antenna is centered in this hole by a supported porcelain insulator and guides. The antenna length used is 80 meters. The antenna weight is of lead, is pear shaped, about $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches maximum diameter, and is connected to the antenna by a spiral spring with fairly high tension. Apparently no attempt has been made to install any ground system.

Miscellaneous.

Only the squadron leader's machine of a group of fighting seaplanes carries wireless. All reconnaissance or bombing machines carry wireless.

No visual signaling apparatus was seen.

Only one helmet was seen; this was black leather with no special fittings. The telephone receivers had been removed.

In some instances the wiring was sheathed; but this practice is not universal.

In general there appears to be nothing novel in the apparatus, though, of course, no piece of apparatus could be given anything but a very cursory examination.

No D.F. apparatus is installed in the seaplane. All navigation by wireless is done by means of D.F. apparatus ashore.

ENGINEERING.

GERMAN SUBMARINE ENGINE—HANDLING OF.

Source: Service Instructions for M. A. N. Marine Oil Engine, Reversing: Type S 6 V, 35 by 35, 550 Horsepower, for German Submarines, 1916–17 (Translation).

12 May 1919.

(11636)

PREFACE.

The following instructions are to serve simply to call attention to these matters which require special note in connection with M. A. N. marine engines. They are not intended to be a complete treatise on the handling of engines in general. Also all possible troubles are not mentioned. These service instructions can not replace the unremitting training of the engineers and the M. A. N. refuses to accept the responsibility of failures due to neglect on the part of the engineers on the ground that no mention was made in the Service Instructions.

These instructions must be carefully read through from time to time by the chief engineer.

These instructions are not to be shown to third persons or competitors without our consent.

II. PREPARING TO RUN WHEN THE ENGINES HAVE NOT BEEN USED FOR SOME TIME.

After laying up for some time on important overhaul jobs, the engines must not be started up without careful and thorough inspection.

In the following, many inspections, etc., are given which need not be carried out each time, but the chief must decide just which are necessary.

A. Valves in the Cylinder Head.

(1) Lubricate the spray valve spindle and test for easy motion. When the seats are bad valves must be ground in. Before replacing the valves see that the nozzle holes are clear, unless the valves have been gone over lately.

(2) Test the exhaust intake and starting valves with the testing lever for easy movement. If any are stiff the spring plates must be lubricated with a mixture of lubricating oil and fuel oil. If this is not successful the valve must be dismounted and cleaned.

(3) Check up clearance of all valve rollers. The clearances are as follows:

Spray valve, 0.05 to 0.2 mm. (Exact according to table.) } measured on a 45° angle
Starting valve, 0.6 mm.
Inlet valve, 0.6 mm.
Exhaust valve, 0.8 mm.

Proper adjustment of the spray valve tappets must also be made.

(4) The reverse gear must fit in with the tappet rocker arms in both forward and reverse position; the travel of the reversing lever is 35 mm.

B. Air Compressor Valves.

If these valves have not been looked after during the lay-up they must all be taken down and set up again. In setting up follow the instructions on page 58.

C. Fuel Oil.

(1) Blow the water and sediment out of the service tanks and fill up the tanks.

(2) Open all cut-off valves from the service tank to the motor.

(3) Test the fuel pump float for easy movement, lightly pressing on the float; see if the fuel oil flows. (Cock on float chamber open.)

(4) The regulating gear of the fuel-oil pump must move to its maximum position without sticking, but the fuel-oil hand regulating valve must be in the position "N" (normal load) during this test.

(5) Check up the position of the suction-valve mechanism of the fuel-oil pump (inclusive of the pump for spray air). (See p. 55.)

(6) Check up the working of the fuel-oil pump for each cylinder and pump the pipes full up to the test cock. (See pp. 55 and 56.)

(7) See that the cut-off mechanism of the fuel-oil pump works properly. (See p. 54.)

(8) Close the cut-off cock before the fuel-pump float chamber.

D. Lubricating and Cooling Oil.

(1) Clean out the lubricating-oil filter, the strainers in the sump tank, and the crank case.

(2) Pump the water and sediment out of the sump tanks.

(3) Verify the amount of oil in the sump tanks (sound holes). With the engine standing still, these tanks must be about two-thirds full. When necessary to fill, be sure the water and sediment have been pumped out.

(4) All cocks and valves on the sump tanks and on the motor to be put in running position (both filters cut in). The vent cocks on the cooler are then to be opened. The gauge cock is to be fastened in the open position.

(5) Start the electrically driven lubricating-oil pump and force oil through the engine. The pressure for the crank-case lubrication shall be set at 1.8 atmospheres. The cocks, or the water outlets, of the cooling system are to be opened to see that the various leads are not stopped up.

(6) All the lubricating-oil leads are to be inspected for leaks, especially those inside the crank case, which can be inspected through handhole plates.

(7) All the lubricating valves on the various leads are to be opened a little wider until it is evident that no bearings are heating, after which they are to be brought back to their original position, which must be marked.

(8) All moving parts that are not lubricated by pressure are to be carefully lubricated by hand. Fill up all stuffing boxes and screw down tight.

(9) Fill up the mechanical lubricators on the air compressor and turn by hand until oil comes out of the overflow valves.

(10) Jack the motor over several times by hand. While the motor is being jacked by hand run the auxiliary oil pump for the main cylinders and air compressor by pressing down on the little valve at the cylinder entrance.

(11) As soon as all is clear the pump can be stopped.

(12) When the engine pump is in service the cut-off valve in the lead from the electrically driven pump is to be closed.

E. Cooling Water.

(1) Clean out the filter and blow out sea box.

(2) Set all cocks and valves in running position. (The gauge cock must be fastened in the open position.)

(3) Start up the electrically driven cooling water pump.

(4) Verify the flow of water through each individual part of the engine.

(5) Inspect all leads and stuffing boxes for leaks, including those inside the crank case.

(6) As soon as all is clear pump can be stopped.

(7) When using the engine-driven pump cut in the sniffling valves and cut out electrical pump.

F. Starting and Spray Air.

(1) Open the compressor throttle.

(2) Close the valves for spray and starting air.

(3) Close the drain cocks and the overflow valves from the starting tank.

(4) Open the overflow valve on the starting tank.

(5) See that all the gauge cocks are fastened open.

(6) Dismount (cut out ?) the check valve on top of the fuel oil test valves and then cut in the fuel-oil leads.

(7) Open slowly valve on the spray air flask which is connected with the spray air leads.

(8) Blow out the holes in the fuel-oil leads by opening one after another the test valves.

(9) Fill the spray air flasks from the high-pressure system to about 60 atmospheres.

(10) Seek out the proper position for the pressure valve on the spray air leads. In the stop position of the starting levers, the pressure valve must be opened 1 to 2 mm. The relief valve must blow off at about 45. (See p. 60.)

(11) Set the spray air reducing valve about 38 or 39 atmospheres. (See p. 61.)

(12) Inspect the whole spray air leads and the stuffing boxes of the spray valves for leaks.

(13) Inspect the spray valve seats for leaks while the indicator valves are open and the reverse gear is in neutral. (See p. 51.)

(14) When the exhaust and intake valves have not been inspected for some little time, it is recommended that they be tested out by means of a spray air. (See pp. 51 and 52.)

(15) Test the fuel-oil pump valves under pressure. (See p. 53.)

(16) Open slowly the valve on the spray air flask, which is connected with the air compressor, and see if all leads, air cooler, and water separator are tight. On the air cooler open the vent valves, which are found on top of the housing, whereby any leaks in the nest of pipes can be detected.

(17) Open slowly the valve on the starting flask and inspect the starting leads for leaks.

(18) Seek out the proper position of the main starting valve and the starting pressure-reducing valve; allow 0.5 mm. play between the pressure screw and the main starting valve in the stop position on the starting lever; the pressure-reducing valve must be set at 16 to 18 atmospheres. (See pp. 59 and 60.)

(19) By opening the main starting valve the starting leads to the engine are put under pressure. If a blowing is observed at one or other of the indicator valves, which must be open, then the corresponding starting valve leaks. (Starting lever in stop position.)

(20) Now, close the valves on the spray air and starting flask and allow the pressure in the leads to escape through the vent cocks.

(21) After the check valves on the top of the fuel-oil test valves have been cleaned they are to be remounted.

(22) The leads between the test valve and the fuel-oil valve are each to be filled by 15 strokes of the hand pump.

(23) Further preparations for starting are to be taken from the following paragraphs.

III. PREPARATIONS FOR STARTING UP AFTER NORMAL SERVICE STOPS.

The following steps are intended to be followed after submerging. Should the engine be started without having submerged, then the corresponding steps will be omitted.

In standing by, starting, and stopping, the following order will be adhered to as nearly as possible:

(1) Open the outward circulating water valve and after a time close the air vents and the drainage valves on the muffler when there are any.

(2) Jack the engine over by hand at least one revolution with the indicator valves open and the reverse gear in neutral.

(3) Cut out hand jacking gear.

(4) Both starting levers to be kept in stop position.

(5) Open outboard exhaust valve.

(6) Engage friction clutch.

(7) Close vent cocks and valves on the starting and spray air leads; also the indicator valves.

(8) Open half way the hand fuel oil control.

(9) Open the air compressor throttle lever.

(10) Place all valves and cocks for fuel oils, lubricating oil, and circulating water in running positions.

(11) See that fuel oil float is not stuck.

(12) Pump about 10 strokes with hand plungers on the fuel pump into each of the spray valves. (This is only necessary when the motor has been stopped for some time.)

(13) Close the drain and overflow valves on the engine except those leading from the starting tank.

(14) Oil by hand all parts that are not pressure lubricated, fill up and set down on all stuffing boxes, and work the oiler of the air compressor by hand.

Immediately before starting.

(15) Reverse gear must always be turned all of the way to the forward position.

(16) If there is any reason to believe that there is any water in the cylinders, turn the engine over for a few revolutions by air with the indicator valves open. To accomplish this place the starting lever on the starting position; then crack the main valve on the starting tank very carefully so that the motor turns over slowly. If there is any water in the cylinders, it will be indicated by spray from the indicator valves. To get all the water out of the cylinders place the piston on top dead center and then admit spray air through the hand fuel-oil valve until dry air is blown out of the indicator valves.

(17) Start up the electric water pump and the oil pump if there are any.

(18) Slowly open the valves on the spray air and starting air tanks.

The pressure in the spray air tank must be at least 50 atmospheres. If the pressure is too low, it can be built up from the starting air or the ship air. If this is not possible, the engine may be driven by the electrical motor and so pump up the required pressure.

If this is also impossible, the tanks may be filled with carbonic-acid gas; other gases must not be used, especially oxygen or hydrogen, as these would be very dangerous.

The pressure in the starting tank must not be more than 160 atmospheres nor less than 30. The starting air is automatically reduced before entering the cylinders to 16 to 18 atmospheres by a pressure-reducing valve.

The motor is now ready to start.

IV. STARTING THE ENGINE.

A. BY AIR.

(1) If the engine telegraph shows astern, the reverse gear must first be operated.

(2) The long starting lever (for cylinders 4, 5, and 6) is brought to the starting position. The short lever (for cylinders 1, 2, and 3) is so interlocked that it will also be brought all the way back so that all six cylinders receive starting air.

(3) Open the exhaust cut-off valves as soon as motor turns over.

(4) As soon as the motor has attained sufficient speed for firing (about 150 revolutions per minute)—though as a rule a lower speed will suffice—shift the long lever to the running position so that 4, 5, and 6 are firing and 1, 2, and 3 are still air driven.

(5) After a few more revolutions push the short lever to the running position so that all six cylinders are firing. Be sure the starting levers are in proper position so that the interlocking gear is operative.

(6) If the motor does not fire at once, unless something wrong can be detected, try starting again.

(7) On starting, observe the various gauges carefully. After a few revolutions the pressure on the lubricating oil, circulating water, and for the intermediate stages of the airpump should commence to rise. Should, however, any needle remain stationary the motor is to be immediately reported "out of order" and stopped.

(8) At one instant of starting the following pressures are required:

Pressure in starting leads to engine 16 to 18 atmospheres.
Spray air about 45 atmospheres.

These pressures are independent of the pressures shown in the spray air tank and the starting tank.

(9) Shortly after starting, the following pressures should be observed on the gauges:

Lubricating oil, 1 to 2 atmospheres.

Piston cooling	According to revolutions per minute.	1.5 to 3.8 atmospheres.
Circulating water		0.6 to 2.0 atmospheres.

Spray air. (See p. 43.)

Air pump with the throttle wide open.

First step, 3.4 to 3.8 atmospheres.

Second step, 14.5 to 17 atmospheres.

Third step, 48 to 51 atmospheres.

When the pressure in the spray air tank is high (over 80 atmospheres) the third step is somewhat higher.

(10) When all goes well the required speed is obtained by fuel oil hand controller.

(11) Now the two drain cocks on the exhaust leads are to be closed.

B. BY ELECTRIC MOTOR.

After laying up for a considerable length of time it is best to start by means of the electric motors as the oil motor can be started more slowly and time and care can be taken to see that everything is clear. It is also necessary when there is not sufficient pressure in the air tanks and the auxiliary compressor is broken down or when the starting gear is out of order, or when the temperature in the engine room is so low that starting is difficult.

(1) At "stand by" the same steps as shown above are taken except that the fuel-oil regulator is put at zero and no oil is pumped into the vaporizers.

(2) The starting levers are left, at first, in the stop position.

(3) Care must be taken to see that the reverse gear is set in the same direction as the electric motors.

(4) The indicator valves are to be open on starting and are to be closed after a few revolutions.

(5) Both armatures of the electric motors are to be switched in series, and under no circumstances must the half switch be used.

(6) The motor is to be started as slowly as possible, i. e., with maximum exciter current. The revolutions per minute are to be increased slowly by cutting down the field.

(7) The starting levers are not to be shifted to running position until the engine is turning over at least 150 revolutions per minute nor until the pressure in the spray air tank has reached at least 40 atmospheres.

(8) By means of the hand controller the fuel oil is gradually admitted. As soon as the motor starts to fire, which can be observed by the diminished load on the electric motors, then cut off the electricity.

(9) Pressures can be observed as above given.

V. HANDLING THE MOTORS WHILE RUNNING.

(1) Great care must be taken to avoid running at critical speeds. When going from one speed to another the critical speeds must be passed as quickly as possible. (See p. 44.)

The exact revolutions per minute of the critical speeds are given in the tables and are distinctly marked on all the tachometers.

(2) The load must be taken up gradually. The following can serve as a guide:

From a cold start allow—

For G. P. (normal cruising speed ?) 5 minutes.
For A. F. (normal full speed ?) 10 minutes.
For A. K. (emergency full speed ?) 15 minutes.

(3) From time to time, especially after laying up a long time, inspect and verify the spray air pressure regulator.

(4) The spray air tanks and starting tanks are now to be pumped up to 120 to 160 atmospheres, in order to have a sufficient supply for maneuvering. To accomplish this open wide the overflow valve to the starting tank and the air-pump throttle and then the air will flow from the spray air tank through the overflow valve on the engine to the starting tank. Care must be taken to so regulate the valves that the air in the spray air tank does not fall too low. When the starting tank has been pumped up, close the overflow valve from the spray air tank and set the air pump throttle so as to maintain from 80 to 90 atmospheres in the spray air tank.

R. p. m.	150	200	250	300	350	400	450	
Position of the throttle	1.2	1.7	2.5	3.6	5.0	6.8	10	
Spray air		40–45		48	55	66	78	Atm.
Spray air tank				80–90				Atm.
First stage		2.8–2.2		2.2–2.6		2.6–2.8		Atm.
Second stage		9–10		10–11		11–12		Atm.
Third stage		32–34		34–39		40–44		Atm.
Starting tank				120–160				Atm.
Lubricating and cooling oil:								
Before filtering	Not more than 0.3 atm. higher than after filtering.							
After filtering	1.8–3.0			3.5–5.0				Atm.
Piston cooling	1.5–2.5			2.8–3.8				Atm.
Lubricating	1.0–1.5			1.5–2.0				Atm.
Pressure on circulating water	.0.6		0.9–1.2			1.4–2.0		Atm.
Gauge of the spray air	0.6–0.9		1.0	1.8		2.8	3.9	
Temperature of—								
Main cylinder discharge	18–25		25–32			32–38		° C.
Piston cooling discharge	25–30		30–35			35–40		° C.
Lubricating oil cooler discharge	18–20			20–25				° C.

The pressure in the spray air leads is not greatly affected by pumping higher than 80 atmospheres, on account of the automatic working of the spray air-pressure regulator; since, in attaining the higher pressures, the air must be greatly throttled down, it is generally unnecessary, in order to hold the proper pressure corresponding to the revolutions per minute, to set at its lowest position the oil-pressure valve of the spray air-pressure regulator. In no case must the pressure on the spray air leads exceed 80 to 85 atmospheres. For this reason the safety valves in the spray air leads are set at 90 atmospheres. From this it is evident that a pressure in excess of 80 atmospheres must not be obtained when the spray air-pressure regulator is not in good order, because in this case the higher pressure from the spray air tank would be carried over to the spray air leads, which must be avoided under all conditions.

In emergency pumping to a high pressure by means of cutting out the spray air-pressure regulator in such a way that the spray air may be throttled down by the main cut-off valve on the spray air tank.

(5) All gauges and thermometers are to be watched carefully at all times. The needles of the gauges must be on the blue field, more exactly—

At slow speed, below and close to.

At high speed, at the upper end.

The pressures must never go above the red marks on the gauges nor below the green marks.

Temperatures are to be ascertained by feeling the various parts and leads. The thermometers are to be used only to check up when in doubt. The above tables give the proper pressures, etc.

The temperatures are given with the assumption that the entering water is at about 10° C. When the water is warmer the overflow temperatures are somewhat higher.

The pressures and temperatures are given for running with both propellers. When only one motor is used the figures are somewhat higher for the corresponding R. P. M. The same is true while charging. The pressures for the intermediate steps and the blue marks on the gauges are for the normal running position of the air-pump throttle. When the tanks are being pumped up—that is, when the air-pump throttle is wide open—the pressures are somewhat higher. (See p. 57.)

(6) The regulation of the circulating water is accomplished by means of a by-pass valve, situated on the discharge of the pump, which allows part of the discharge to return to the suction lead.

Circulating water should be discharged from each cylinder at about the same temperature. This condition can be obtained by means of regulating cocks situated on the discharge leads. In order

to avoid undue heating of the motor and salt deposits the discharge temperatures must never exceed 50° C. The water discharged from the air pump and the air cooler should be as cold as possible.

If the water-driven (not electric) pump is used, the sniffel (Schnuffel?) valves are to be opened as far as possible compatible with a quiet running of the pump. If necessary, the cock in the section leads can be shut down a little. No more air shall be drawn in (eingeschnuffelt?) than is absolutely necessary. In no case must the forward part of the pump be regulated by the sniffel valve.

Under no condition must a large amount of cold water be driven suddenly into the hot engine. This would cause a sudden cooling and might cause considerable damage by cracking the cylinder heads or seizing of the pistons. When the circulating water can not be increased and the temperatures are too high, the engine must be stopped at once.

(7) The water condensed from the air under pressure is to be drained off regularly, from the separator every 15 minutes and from the spray air tank and starting tank first immediately after pumping up and then about every two hours. To accomplish this on the separator it is only necessary to open the valves provided for the purpose; the drain valves remain closed, because the connection from the separator to the bilge suction pipes does not go through the drain valves. Only one of these valves from the high-pressure separator must be opened at a time in order to prevent the condensed water from being driven into another separator. To blow the condensed water out of the spray air tank and the starting tank the two overflow valves must be closed for a short time and the drain valve opened. The draining of the tank is accomplished by separate opening of the corresponding overflow valves. The drain pipe must not lead directly into the bilge, but must be directed into a funnel, so that it is easily visible.

(8) The hand lever on the fuel-oil controller should never be placed beyond the mark "N" (normal load). Only in the greatest emergencies, and then only for a short time, can the engine be overloaded. This is accomplished by forcing the spring down by hand. Care must be taken to pass through critical revolutions per minute as quickly as possible.

(9) The bearings and all other moving parts are to be watched carefully and touched with the hand from time to time on some safe place. The base-plate bearings (Grundplattenlager) may be tested by opening the three-way cock on the oil feed. The crankshaft bearings may be tested by feeling or removal of the handhole cover on the base plate.

All bearings, tappets, links, valve guides, etc., which are not connected with the pressure lubrication must be oiled by hand every hour and the grease cups drawn up.

(10) When filling the oilers for the air pump care must be taken to see that the oil-suction holes are covered with oil, as the oilers fail when air is drawn in. Immediately before and after filling work the hand oiler a little.

Observe the proper working of the oiler.

(11) Only fresh air is to be used for filling the spray air regulator.

(12) The service lubricating oil tank is to be kept at least half full; the level is therefore to be checked from time to time by sounding.

Considerable rising of the level of the oil in the tank would permit the flow of circulating water inside the motor.

(13) Depending on load conditions and quality of the lubricating oil, the filter must be taken down every 12 to 24 hours and the plates (sieves) cleaned (see p. 42). Damaged plates must be replaced at once.

(14) The water circulation through the oil cooler is to be regulated so that the oil for the bearings at the discharge is not warmer than 30° to 35° C. and not cooler than 18° to 20° C.

(15) Care must be taken to shift from one fuel oil service tank to another at the proper time. Before shifting examine the tank about to be used, for water. The level of the fuel oil in the float chamber is to be watched carefully.

(16) Air discharged from the cooler must be as cold as possible—never more than 35° to 40° C. When an increase of circulating water is of no benefit, the nest of pipes (Rohrenbundel) must be cleared.

(17) On long runs the rocker-arm rollers must be watched for play. If the proper play (see p. 52) is lacking the rollers will run hot and damage the valve seats.

(18) Under full load the exhaust is almost invisible. If the exhaust is dark, the engine is overloaded or not running properly. (See Troubles in service XI.)

The engine must be kept carefully cleaned in all parts. Watch is to be kept while running for leaks, and from time to time the floor plates must be taken up. At least once every watch an inspection must be made back of the engine (exhaust side). Any trouble discovered must be reported at once and repaired as soon as possible.

VI. REVERSING THE ENGINE.

(1) Shift the long starting lever to the stop (middle) position. The short lever will be carried to the same position automatically.

By this action the drive of the fuel oil pump will be cut off and the fuel oil valves will be cut out.

(2) Place the hand regulator in a half-way position.

(3) The reversing wheel must be turned against the stop. From ahead to astern eight turns to the left. From astern to ahead eight turns to the right.

(4) The engine is now started as explained on page 42.

(5) If, while maneuvering, the engine is stopped, and not immediately reversed, when the electrically driven water pump is in use, the cut off valves in the water leads must be closed until the engine is again started. This is to avoid sudden cooling of the cylinders. On the other hand when the engines are stopped for a considerable period the electrically driven lubricating oil pump must be started in order to cool the pistons.

VII. STOPPING THE ENGINE.

(1) Place the starting lever in the stop position.

(2) Place reverse gear midway between ahead and astern.

(3) Start the electric lubricating oil pump.

(4) Stop the electric circulating pump if it is being used.

(5) Close the exhaust cut off valve.

(6) Open the drain cocks on the exhaust leads before and after the cut off valve.

(7) Pull out the friction clutch.

(8) If about to submerge: (a) Shut the exhaust valve (Ausfufschieber). (b) Open the vent and drain valves of the muffler. (c) Close the circulating water outboard cut offs.

(9) Close all valves on the starting and spray air tanks.

(10) Close the overflow valves on the engine.

(11) Open the drain valves on the high-pressure separator.

(12) Open the vent cocks and valves on the spray and starting air leads and also the indicator valves.

(13) Close the cocks in the fuel oil leads.

(14) Ten minutes after stopping the engine stop the oil pump.

(15) Immediately after stopping feel all bearings to see if any one is hot; all indicator valves in the cylinders and air pump must be open, pressure must be taken off the spray air and starting air leads. The main starting leads are vented by placing the starting lever in its starting position for a short time. Carefully observe all the gauges to make sure that no pressure is left in any of the leads. This is absolutely necessary to avoid the possibility of an accident. Turn the engine over by hand to reach the various bearings.

The engine is to be thoroughly cleaned throughout; any troubles discovered must be remedied, no matter how small they seem.

VIII. OBSERVATIONS WHILE SUBMERGING.

While submerging the draining of the exhaust leads must be observed in order to make sure that the exhaust clappet and the exhaust cut-off valve are watertight. It is therefore necessary that the drain discharges be visible. If there is any leak, the bilge pump must be started in time to prevent water from reaching the electric installation or doing other damage while the boat is on an even keel.

The gauges of the circulating water leads are to be watched to make sure that the outboard valves are tight. In such cases it is to be remarked that the safety valve on the air cooler housing should be set at 5 atmospheres, so that when diving below 50 meters with untight outboard valves water should escape from the safety valve. When the outboard valve can not be made watertight, the safety valve may be screwed down tight by the screw provided for the purpose.

IX. LAYING UP THE ENGINE.

(1) When the engine is out of service for a considerable length of time all parts are to be thickly covered with grease to prevent rusting.

(2) In freezing weather all circulating water must be drained off to prevent damage to the leads, water jackets, etc. This is especially important when the boat is to be docked in winter.

The draining is accomplished by opening the drain cock, which is located at the lowest point of the lead between the engine and the oil cooler. This drains everything up to the exhaust-valve housing, the exhaust leader (auspuffkegel) and the oil cooler. These must be blown out by means of low-air pressure (about 5 atmospheres). For this purpose special cocks are provided in the vent leads of the circulating water discharge and in the air cooler. Proper blowing out of the water can only be accomplished by closing off all the cooling chambers and emptying them separately one after the other. To drain the air pump completely, there is a special cock provided on the cylinder on the side toward the air cooler.

If the temperature is so low in the engine room that the engine does not start at once, use may be made of the electric motors. (See p. 43.)

X. UPKEEP.

In order to keep the engines in reliable condition it is necessary to dismount the various parts at regular intervals and clean them thoroughly rather than to wait till some trouble makes the dismounting necessary. The following intervals of time laid down for the dismounting and cleaning of various parts may be changed to suit different conditions, depending on the service performed and personal experience.

It is manifestly impossible to lay down hard and fast rules for the length of time between inspections, as service conditions vary and fouling varies with the quality of the lubricating oils and the fuel. The skill of the engineers is an important factor, especially their ability to detect quickly any irregularity in the running of the engine.

Experience has shown that it is a bad plan to wait until a number of parts have to be dismounted before repairing any one part, as in this case the work is always more hurried and not so careful.

Before commencing any sort of overhauling of the engine precautions against unintentional starting of the engine, as given on page 46, must be carefully carried out.

Besides this the clutch between the engine and the electric motor must be disengaged. Particular care must be taken in dismounting any part of the reversing gear, as damage may be easily done if the remounting is not properly carried out. After overhaul of any sort the inside of the engine must be carefully freed of dirt, grinding compound, etc. The engine must be turned over a number of times by hand to make sure that nothing sticks; it goes without saying, after remounting, each part must be carefully checked up.

(1) MAIN PISTONS.

The piston heads must be freed from carbon from time to time by dismounting the exhaust valve. This can always be done when the valves are ground in. The main pistons must be dismounted about once a year to clean the rings, unless a faulty assembly has made them leak sooner. Every time the piston is dismounted the piston cooling chambers must be cleaned out.

The two oil rings on the piston serve to send back to the crank case the excess lubricating oil. The flat cylindrical part of these rings must be toward the bottom. Should the flat part be less than half the width of the ring, the rings must be replaced. The pistons can only be dismounted from the top, and therefore the cylinder head must be removed. The cooling system can be dismounted by loosening up the bolts in the links. The engine must be so turned with the crank in a horizontal position. Special piston bolts are then screwed into the piston so that it can be lifted out.

In assembling the piston the same remarks hold good in reverse order. The piston must be carefully lubricated and the position of the rings carefully checked up with regard to piston-ring set pin. When a spare piston is assembled it must first be well lubricated; when the engine is started this piston must have extra lubrication and the engine must be run at low speed for some little time. The engine must not be loaded full until after about 24 hours' run. The piston must be watched carefully to see that it does not heat up.

The neight of the compression chamber, i. e., the distance from the top of the piston to the under side of the cylinder cover, is 16.8 mm. Variation of 0.5 is allowable. In order to secure the proper compression, the wrist pin bearing of the connecting rod is made separate from the connecting rod and connected thereto by screws, so that its length may be varied by the use of shims between the bearing and the rod. Great care must be taken to use shims of exactly the same thickness in order to have the rod exactly vertical.

In fitting new piston rings care must be taken to have the proper play between the ends of the ring. The proper play for new rings is 1.6 mm.

(2) BEARINGS AND PINS.

These only need be inspected when the bearing gets hot or when it has to be taken up on account of the wear. When a bearing is loose, it can generally be detected by knocking.

When starting up again after scraping in a bearing, great care must be taken to see that it does not run hot. It is often necessary to slacken up the bearing cap nuts and put in an extra shim. Great care must be taken in putting in new bearings not to spring the crank shaft. The play in the bearings is made as follows:

	Mm.
For the main bearings and lower end of connecting rod bearings	0.1
For the main wrist pin bearings	0.075
For the air pump wrist pin bearings	0.05

(3) STARTING VALVE.

The starting valves are to be dismounted and inspected in about 400 hours of running.

Leaky starting valves can be detected by the heating of the respective air pressure leads. Besides this, leaky starting valves may be detected by opening the indicator valves when there is pressure on the engine. To accomplish this, place the reverse gear in neutral and the starting lever on the stop position, which closes all valves in the cylinder head. Open slightly the main starting valve with a screw driver until there is a pressure of 17 atmospheres in the starting leads. If one of the starting valves leaks, a hissing will be heard at the corresponding indicator valve.

To dismount the starting valve it is not necessary to take off the rocker arm shaft; it is merely necessary to push to one side the rocker arm shaft of the next intake and exhaust valves. The split ring on the rocker arm shaft axis must be pushed to one side. In remounting the starting valve care must be taken to see that the gasket of the valve seat checks up with the gasket in the cylinder head so as to make the valve seat tight. If one gasket sticks up, shims are to be used to bring the gasket to the same thickness. The

play between the rocker and roller and the cam must be 0.6 mm. The adjustment of the play is accomplished by means of the screw on the rocker arm.

(4) SPRAY VALVE.

Before inspecting spray valve allow the pressure in the leads to escape. The spray valves must be dismounted every 40 to 50 hours and the packing and upper guides lubricated.

The valves must not be dismounted after pumping the leads full of oil by hand, otherwise a large amount of oil will get in the cylinders and cause a very heavy explosion.

The fuel valves must move so easily in their packing that they can be withdrawn by the small spring. The valves must fall onto a seat by themselves when turned around two or three times. When mounting the valve, turn it back and forth. If it sticks in one place and goes easily in another, the valve is bent and must be immediately replaced. The vaporizer in the fuel oil head must be immediately replaced. When the vaporizer is dirty, the exhaust is cloudy. From time to time, about every four weeks, the jet holes are to be cleaned out with brass wire of the proper size. If no dirt is observed, a longer interval must be left between inspections. In dismounting the spray valves, if the housing will not pass the rocker arm the rocker arm must be dismounted. The packing of the spray valves must only be drawn up while the engine is standing still. Attempting to accomplish this while the engine is running might cause very serious damage. When a spray valve stuffing box leaks, it is not permissible to put new packing on top of the old. In such cases proceed as follows:

Remove the old packing material and clean the stuffing box carefully. Turn the valve stem and stick it in the stuffing box upside down. Then with the help of the special tool put the packing in, in thin layers. The lead packing is shredded into pieces about 200 mm. long and 10 mm. thick, well greased, and wound around the valve stem.

In putting in the packing, take care to completely fill up the sleeve of the stuffing box, otherwise the valve stem will not be straight and will leak.

The stuffing box must only be filled to such a point that the lock nut does not completely enter the stuffing box. The valve stem must be worked by hand until it moves easily.

If the valve stem has too much play on its guide, more packing must be put in. While screwing in the stuffing box, work the valve stem back and forth to make sure it is not cramped. When the valve housing is remounted the valve stem must be

free enough to be raised by the little spring. Small leaks in the stuffing box are harmless and will generally cease after a little use. If they do not, the stuffing-box nuts must be set up the next time the engine is stopped.

To secure a tight valve stem as well as good combustion it is necessary that the stem be exactly centered in its seat. To verify this, blue (Prussian blue) the stem of the valve and move it up and down a few times without turning. The blue should then show all the way round the valve guide. Before doing this the guide must be carefully wiped off.

Unnecessary grinding in of the spray valve is to be avoided; it is only necessary when the seat has been damaged and leaks. To test the spray-valve seats for leaks, open the spray air tank and the indicator valves. Set the starting lever on neutral and the reverse lever on neutral. Should there be a leak, the spray air will blow out the corresponding indicator valve. In grinding any spray valves use only the finest grinding compound. The clearance of the rollers in the 45° position, i. e., when the main crank is 45° before the firing-top dead center (see marks on the clutch) shall be 0.05 to 0.2. An exact adjustment of the roller clearance and at the same time of opening of the valve can only be exactly made by means of the indicator diagrams. When the exact position has been found it must be noted in the table. For the purpose of adjustment the valves are fitted with adjustable washers, which are to be of such thickness that the desired clearance is obtained.

In order to set the firing point exactly, the fuel rocker arm is provided with an eccentric nut. The position of the rocker arm may be varied slightly by means of this eccentric while the engine is running. To decrease the clearance and thereby advance the firing point, the scale on top of the sleeve must be turned toward the center of the engine and vice versa. In fitting the adjustable washers the eccentric sleeve should be placed in the middle of the scale so that the clearance may be varied in either direction.

To determine the time of the opening and closing of the fuel valve, place the starting lever in running position and the spray air leads under pressure. Open the indicator valves, then turn the engine over very slowly by hand: as soon as the fuel valves begin to open a hissing is heard in the corresponding indicator valve. The fuel valves must open 7° to 10° before top dead center (exact adjustment to be made according to the indicator diagram); the closing point, which should be about 42° after top dead center, can also be checked up by the hissing in the indicator valves.

When a new valve is mounted, the stuffing box must be repacked and a proper clearance set according to the table. When fitting a new valve tappet (inset cam) care must be taken not to screw it in

upside down. The tappet is dismounted so that the cross which is marked thereon comes opposite the cross on the cam. The springs of the fuel valves must be set up to about the same strength; this means to about 16 mm., which corresponds to a closing pressure of 240 kilos.

(5) INTAKE VALVE.

The air intake valves are subject to very little wear and need to be inspected as a rule only every six months. To see that the intake valves have a good seat turn the corresponding cylinder to the firing top dead center. Close the indicator valves, place the starting lever in service position to allow spray air to flow into the cylinder through the fuel-oil valve. If the intake valve leaks, the escape air can be heard immediately over the valve. In dismounting the intake valve, the rocker arm axis does not need to be dismounted. The reversing gear axis need only be pushed to one side.

The clearance of this valve is to be 0.6 mm. Care must be taken to set up the lock nut tightly after setting this clearance.

(6) EXHAUST VALVE.

The exhaust valves are, under normal conditions, to be inspected and ground in after 400 hours of running. In very hard service or with great overloads the exhaust valve must be inspected more often.

The exhaust valves are water cooled. The inside of the valve must therefore be cleaned from time to time to insure proper cooling.

The remarks about the dismounting of the intake valves apply equally to the mounting of exhaust valves, with the exception of cylinder six, on which the rocker arm must be dismounted. The same tests for leaking exhaust valves may be made as for leaky intake valves, except that the escape air will be noticed in the exhaust pipes which are provided with a test cock. The clearance is 0.8 mm.

The starting valves, intake valves, and exhaust valves must move easily; in order to make this inspection easy, a special lever is provided whereby the rocker arm may be lifted up. The flange bolts must be drawn up equally, and not too tight, as otherwise the housing might be bent.

For grinding in the above valves fine emery with oil must be used, or special grinding compound made by the M. A. N.

(7) SAFETY VALVE IN THE CYLINDER HEAD.

Safety valves in the cylinder head become leaky only when a great deal of blowing off occurs, due to improper pressure in cylinder. A leaky valve may be detected by becoming hot when the motor is running.

It is advisable to adjust the safety valves every three to four months, even when they show no signs of defect.

Safety valves are set at 50 atmospheres, and meant to call attention to and prevent higher pressures. Frequent blowing off of these valves while the motor is running shows too high spray air pressure or improper setting, sticking, or leaking of the fuel-oil valve, unless the valve has become leaky through loosening up its spring. When this occurs the motor must be stopped immediately and the cause of the disturbance determined. If a blowing off occurs during the starting, it is caused either by sticking or leaking of a fuel valve or a starting valve. It may also be caused by the collection of too much fuel in the cylinders or too much spray air pressure. Blowing off may also be caused by very heavy pressure in the cylinders, due to starting when too low revolutions per minute or when the fuel-oil cut-out mechanism is not working properly.

The lock nut on the top of the valve serves to limit the stroke of the valve to about 4 mm. ($1\frac{1}{2}$ turns). The nut must be well locked in this position. In case of sticking of the valve or breaking of the valve spring, the valve may be drawn up to its seat by means of this nut, whereby the valve is put out of service. This emergency measure may only be used in case of necessity, and only for a very short time. The valve must be repaired as soon as possible.

(8) OPERATION OF THE VALVES.

The firing order in going ahead is as follows:

Starboard motor cylinders, 1, 5, 3, 6, 2, 4.

Port motor cylinders, 1, 4, 2, 6, 3, 5.

The position in which the screw gears of the valve gear must be assembled is marked. In assembling the upper screw gear the engine must be turned so that the fuel pump on the drive-shaft side (cylinders 1, 2, and 3) is at the pressure stroke. The marks on the screw gear come together when piston No. 1 in going ahead is 20° before the firing dead center. The fuel-oil tappet of cylinder 1 must lay back and not in front of the lever roller. These adjustments between the drive shaft and the fuel-oil pump drive must be vigorously followed. (See p. 55.)

In replacing the lower screw gears on the vertical drive shaft the top half of the shaft must first be taken out, after having loosened up the flange coupling and removed the upper bearings caps. Then the lower end of the shaft can be taken out through the top.

When replacing a new screw gear there should always be 0.1 mm. play between the teeth; if this is not the case, the teeth must be carefully filed off. While overhauling the valve gear drive, the engine must under no circumstances be turned over unless reversing gear is in neutral; otherwise one of the open valves would be damaged by one of the pistons.

(9) FUEL-OIL PUMP.

The valves of the fuel-oil pump are subject to very little wear provided the fuel oil is clean and always well filtered. It is sufficient, therefore, as a rule, to inspect these valves every five or six months and grind in when necessary; too much grinding is bad. For the grinding in of these valves, use only very finely powdered glass that has been sifted through fine cloth. To test out the valves of the fuel-oil pump for leaks remove the check valves on top of the fuel-oil testing valves and connect up the fuel-oil leads, turning the engines so that the piston of one of the pumps comes to about the end of the pressure stroke. Then put the pump under pressure by opening the valve in the spray air tank and open one after the other the test screws on the top half of the hand pump. If one of the check valves (upper pressure valve) leaks, then the fuel will be driven out of the corresponding lead and spray air will blow out of the test screw.

If the test valves are in proper condition, close down the test screws and try to pump by hand; the starting lever must be in its running position and the fuel controller set on mark "N." If the piston can not be moved at all, or only with considerable pressure, the suction valve may be considered tight. If it is easy to move the piston, then either the suction valve or the seat in the housing is leaky.

To test out the other half of the pump the motor must be turned over one full turn. Before replacing the valves the pump housing must be carefully washed out. Care must be taken not to exchange the spring of the pressure and check valves, which are of the same diameter. The longer spring belongs to the check valve.

After overhauling the pump it must always be tested by hand before being put into service. To accomplish this, the hand lever of the fuel regulator must be set on "full open" and the engine turned to the above-mentioned position. The test screws are to be opened and the hand pump to be worked as in the stop position of the starting lever the suction valve is held open by the interlocking lever, therefore the pump can not work. It is therefore necessary to turn the star wheel by hand, which forms the interlocking device, so that the suction valve is free. In no case when pumped by hand for this test must the starting lever be put in running position, to cut out the interlocking device; because one or the other of the fuel-oil valves may be opened and the fuel pumped into one of the cylinders, which must be avoided under all conditions.

By means of a hand pump, provided the suction and pressure valve are in order, the fuel will be pumped back into the float chamber, which can be observed by the gauge glass. When the pump does not work at once, press down by hand on the suction valve a few times, so as to get the air out of the pump chamber. As soon as the pump works properly close down on the test screws.

In taking out the pump valves the fuel-oil pressure leads are emptied. It is therefore necessary to insure a proper starting to fill them up with fuel. To accomplish this, open the test cocks in the fuel-oil leads just before their entry into the fuel-oil valves. Pump by hand until no more air comes out of these cocks. Before doing this the pressure in the spray air leads must naturally be let off. Then close the cocks and pump about 15 strokes to each cylinder, so that the leads up to the fuel-oil valves are completely filled. Proceed in the same manner for the other half of the pump when the engine has been turned over one full turn.

From time to time inspect the interlocking device to make sure that when the starting lever is in a stop position the suction valve is held open. In the running position there must be 2 mm. play between the small interlocking lever and the suction valve. In both cases the pump stamping must be at the end of its pressure stroke.

The fuel-oil pump pistons have no special packing, but are ground oil tight in their respective cylinder boxes. When, after a time the pump piston becomes leaky; the piston and its box must be replaced. The piston can be dismounted without taking off the pump. To accomplish this the cross-head pins are to be put in the upper dead center; all the boxes of one-half of the pump are to be screwed out and the plate which binds the pistons to the cross head is to be loosened. Then all four pistons with their boxes and plates can be drawn out when the cross head is turned to the lower dead center. A new piston must at first be well oiled and frequently felt by hand to see if it gets hot.

Dismounting of the countershaft for the fuel-oil pump drive is as follows:

First take out the cross-head pin; after taking out the bearing cap and the connecting-rod head of the water pump the shaft can be taken out toward the front when it is so turned that one of the cranks (for the fuel-oil pump drive) slants up toward the top. The connecting rods for the drive of the fuel-oil pump may be left hanging on the shaft.

In remounting the countershaft care must be taken to see that the fuel-oil pump is set on the drive-shaft side at the end of its pressure stroke (for cylinders 1, 2, and 3) when the piston for cylinder 1 is 20° before its firing dead center. As the countershaft turns at half the speed of the crank shaft, therefore the marks on the gears also come together when the piston of cylinder 1 is in the position just before its intake dead center. This position, however, is wrong, as the fuel would not be pumped into the fuel-oil valve at the proper time. In mounting the countershaft the engine must be so turned that piston *1* is in the proper place before the firing dead center. Then when the marks on the gears come together the cross-

head for the fuel-oil pump will be at its dead center on the driving-shaft side (compare also p. 53). In setting the fuel-oil pump the engine must be so turned that the crosshead of one-half of the pump is exactly on its top dead center. In this position the main pistons of cylinders 1 and 6 are exactly 20° before their top dead center. (See marks on the clutch.) The hand lever of the fuel regulator is set on zero on the scale. In this position the three set screws for the operation of the suction valves of the fuel-oil pump are so set that the tappets just touch the intake valve without opening them. The suction valve for the oil pump to the spray air regulator must be open 1 mm. in this position. This valve must, therefore, be set the same as the fuel-oil pump and then the set screws must be screwed down 1 mm. (about three-fourths of a turn). When this has been done the engine must be turned over exactly one turn and the same operation gone through with the other half of the pump.

The above-mentioned set screws are secured in their proper places by fitted sleeves. These sleeves must not be taken away. A checking up of the mechanism is only required when a suction valve of the pump or a part of the suction-valve drive has had to be changed, or on account of wear of the suction-valve drive, which, however, only appears after several months' running. It is, therefore, not necessary and is also inadvisable to tamper with the set screws.

When the *6* set screws of the fuel-oil pump are properly set all the cylinders should receive the same charge. This is to be checked up by the indicator cards. Should the cards of one cylinder show a smaller charge than another cylinder then it may be assumed that the pump valves, seats, pistons, or pressure leads leak.

When the fuel-oil pump is in proper order and properly adjusted then as a rule the "no load" position of the hand regulator lever corresponds to the mark "L" on the scale, i. e., that position in which the hand lever is placed when the engine runs at 200 revolutions per minute with no load (the field of the electric motor cut out and propeller shaft uncoupled). In this case the spray air pressure should be 39 atmospheres and the throttle of the air pump so set that the pressure in the spray air tank is held at 60 atmospheres. In this test care must be taken to observe that all *6* cylinders are firing, which may be checked up by opening the test cocks on the exhaust leads. If the fuel-oil control lever must be placed a little lower than mark "L," assuming the adjustments to be properly made, the "no load" resistance compared to the original "no load" resistance as determined by the builders has become less on account of the engine having been run in. In such a case all of the set screws may be set down a like amount. If, on the other hand, the hand lever must be placed higher than the mark "L," then it may be considered that the "no load" resistance has become greater, i. e., some

greater friction is occurring; for example, in the bearings or in the gumming (verharzung?) of the piston or some other trouble in the engine. In such case the set screw is not to be immediately unscrewed, but the cause of the greater "no load" friction determined and removed.

(10) GOVERNOR AND GOVERNOR GEAR.

The governor and governor gear must move easily; the links must be cleaned from time to time to prevent the gumming of the lubricating oil.

Before taking down the governor at any time the actual threads are to be measured so that when put together again the springs will be subject to the same tension. A distance washer of the proper size must be fitted between the spring plates and the spring key.

Under "no load" the governor must keep the engine at about 500 revolutions per minute, irrespective of the position of the hand regulator. When setting the governor gear care must be taken that when the hand regulator is wide open there must be 1 mm. play between the governor sleeve and the roller. The governor sleeve must have a travel of 20 mm.

(11) AIR COMPRESSOR.

The air-pump pistons must be dismounted and cleaned every six months. If the efficiency of the pump diminishes on account of leaky pistons they must be taken down sooner. The piston rings which are stuck must be loosened in order to give the proper spring bearing. Careful attention must be given to keeping the air valves in good condition. The valves must, therefore, at least once every 150 hours' service be inspected, and when necessary cleaned. Weakened springs and badly fitted valves must be replaced. Excess fouling of the valves is due to too plentiful lubrication, of too improper working of the oil rings, or improper cooling and cleaning of the air. (See also under "Troubles with air pump," p. 67.)

Disturbances of the air pump, especially of the valves, are recognized at once by diminishing in the pressure of the intermediate stages. To check up the proper working of the pump the air pump throttle should be opened wide and the pressure in the various stages observed. The following pressures should be shown:

First stage, 3.4 to 3.8 atmospheres.
Second stage, 14.5 to 17 atmospheres.
Third stage, 48 to 59 atmospheres.

These pressures are almost entirely independent of the revolutions per minute of the engine and of the actual pressure in the spray air tank. Only the third stage is somewhat influenced, as follows:

The lower figure is good for about 60 atmospheres of pressure in the spray air tank and the higher for 160 atmospheres.

If the pressure of one stage is higher than shown above, it means that either the pressure valve of that cylinder or the intake valve of the next higher cylinder leaks. When the suction valves leak the neighboring suction leads become hot.

The dismounting of the air pump pistons may be done after taking off the upper part of the cylinder in the same way as the working cylinders.

The clearance space in the cylinders should amount to 1 to 1.2 mm.

In assembling the pistons, the set pins of rings 2 and 4 must be opposite to each other. The position of the rings for the other steps is set by the safety pins. To facilitate the assembly of the pistons the steel band accompanying the special tool for the assembly of the rings and of the low-pressure cylinders is used. In assembling and fitting spare pistons, the same procedures are to be followed.

The play between the ends of the ring when they are new are to be as follows:

For stage 1, 1.3 mm.
For stage 2, 1.0 mm.
For stage 3, 0.4 mm.
For stage 4, 0.25 mm.

This must always be checked up when putting in new rings.

In the assembling of the valves the following is to be watched: When setting up the nuts of the valve housings the pressure screw must be withdrawn until it does not touch the valve; to accomplish this, the lock nut must be unscrewed. Then first screw on the housing and set the valve tight in its cone-shaped seat in the cylinder by means of the pressure screw. Then screw the lock nut on again; care must be taken not to mix up the suction and pressure valves. The travel of the valve shall be:

First stage, 3 mm.
Second stage, 2½ mm.
Third stage, 2½ mm.
Fourth stage, 2½ mm.

(12) SAFETY VALVE FOR AIR.

To prevent improper pressures the various stages of the air pump are provided with safety valves, which are fitted in the leads between the pump and the air cooler. These valves must be set to blow off:

First stage at 6 atmospheres.
Second stage at 25 atmospheres.
Third stage at 90 atmospheres.
Fourth stage at 200 atmospheres.

The valves must, under no circumstances, be set at a higher pressure. If, however, on account of weakening of the spring the valves blow off too easily, the tension of the valves may be increased by suitable washers.

Before taking off the spring housing the valve stem must be drawn up by means of one of the studs, which can be reached by taking off a nut. This is to relieve the valve casing from the spring pressure, otherwise the valve seat would be damaged.

(13) AIR COOLER AND WATER SEPARATOR.

The air which comes out of the air-pump cylinder is considerably heated up and must be cooled as much as possible before entering the next stage. To accomplish this, an air cooler is fitted after each stage. In each air cooler is a separate water separator.

To insure proper working of the air pump the air must leave the cooler as cold as possible, otherwise oil and water are drawn in to the next stage, which causes fouling of the valves and piston rings. Therefore, when the cooler does not function properly—after about 1,500 hours of service—the cooler must be taken down and cleaned. At the same time the water separator is to be inspected. The sediment deposit on the nest of tubes is to be removed by boiling in a soda solution. After boiling, the tubes must be blown out by air, or better still, with steam, and if necessary, scraped clean.

The air is also badly cooled when the next of pipes leak, because the air escaping into the water chambers drives out the water. Leaky pipes may be detected by air escaping in large quantities from the cocks on the top of the air-cooling housing.

(14) MAIN STARTING VALVE.

The main starting valve and the pressure-reducing valve are to be overhauled every three to four months. It is easy to detect leaks or sticking in one of these valves by observing the pressure on the gauge for the starting air. If when starting the gauge shows a higher or lower pressure than it is set for, the pressure-reducing valve is stuck in its housing. After placing the starting lever in a running position the pressure in the starting lead must diminish slowly because the operating levers of the starting valves in the cylinder head are not completely tight; if the pressure after starting diminish, the main starting valve has either stuck or leaks. (See also under Safety valves in the starting leads.) In taking down and setting up the pressure-reducing valve, care must be taken not to damage the ground seats in the valve itself.

In setting the starting valve there must be 0.5 mm. play between the pressure screw and the valve stem.

The spring of the starting pressure-reducing valve is to be set so that in starting a pressure of 16 to 18 atmospheres appears behind the valve. With the motor standing still the setting of the valve may be done as follows:

Open the vent cock for the starting leads behind the reducing valve, and with the starting lever in stop position press down on the main starting valve with a suitable tool.

(15) PRESSURE VALVE FOR THE SPRAY AIR LEADS.

The valves must also be inspected every three to four months. In starting, the pressure on the spray air gauge is to be carefully watched. It must automatically come to 45 atmospheres. If this is not the case or if the pressure falls below this figure, the spring on the pressure-limiting valve is not properly set or the valve is out of order. If the pressure valve leaks or sticks it can be detected while the motor is running by a continual blowing out of the discharge openings.

In the stop position with the starting lever the pressure valve is open; therefore, the engine standing still, the pressure in the spray air leads can not be higher than 45 atmospheres. As the pressure-reducing valve of the spray air pressure regulator is not always completely air-tight, the pressure valve blows out slightly when the starting lever is in the stop position. If this blowing out comes very strong, the pressure-reducing valve leaks badly or its spring is under too much tension. The spray air pressure regulator may be out of order in some other way. The pressure valve must be so set that when the starting lever is in the stop position the valve is open 1 to 2 mm. The pressure-limiting valve before the pressure valve must blow off at about 45 atmospheres.

(16) SPRAY AIR PRESSURE REGULATOR.

The spray air pressure regulator must be overhauled every three to four months. If the spray air pressure changes by leaps and bounds, the oil pressure remaining the same, then the ground seats of the pressure-reducing valves or the oil-pressure pistons immediately above them are either dirty or damaged. The valves and pistons are to be carefully examined and cleaned.

It is not sufficient to simply grind in the cylindrical seats with emery. The oil container is to be kept full of clean, fresh oil. The oil strainer in the pressure-reducing valves must be cleaned very often. If the pump fails to hold the oil pressure at its proper point, the spring on the pressure-reducing valve must be given more tension until the proper spray air pressure is attained. Further regulation can then be done by means of the handwheel on the pressure-reducing valve. If the spray air pressure regulator fails through sticking, its spring is to be given as much tension as possible, and further regulation is to be done by means of the air-pump throttle. In such case, in starting or reversing, the pressure in the spray air tank must be reduced to about 45 atmospheres.

In order to check the spray-air pressure regulator turn the engine over slowly (150 to 200 revolutions per minute), press down the

suction valves of both oil pumps so that the pumps do not work and the oil pressure disappears, which can be checked up by the small gauge. Under these conditions the pressure in the spray-air tank is kept at 60 to 70 atmospheres. Then the spring of the air-pressure reducing valve is set so that the spray-air pressure is 38 to 39 atmospheres. This pressure is proper for starting; the spray-air pressure must not be lower than this. When the pressure-reducing valve has been set as described it must not be further adjusted. It may be then that the pressure regulator is not working (see above).

Now release the suction valves, turn the engine over at 450 revolutions per minute with full load, and set the oil-throttle valve so that the gauge on the housing shows a pressure of from 3.9 to 4.2 atmospheres. On a full load the pressure in the spray-air leads is about 78 atmospheres. With a lower revolution per minute the smaller load, the spray-air pressure automatically comes lower on account of the smaller delivery of the oil pump.

The setting of the spray-air pressure reducing valve is 38 to 39 atmospheres, which can also be undertaken with the engine standing still, as follows:

Open the vent cock for the spray-air leads in order to set the leads under pressure. In any case the setting must always be checked up with the engine running.

The setting of the spray-air regulator is given under "fuel-oil pump." (See p. 55.)

(17) SAFETY VALVE IN THE STARTING LEADS.

Considerable blowing off of the valves in starting or reversing may be attributed to a failure of the starting air-pressure reducing valve. If the main starting valve sticks or leaks, the starting leads, after starting, are slowly filled up by the leaks of the pressure-reducing valve, which is not always tight, and the safety valves begin to blow off lightly. In such case the cut-off valve of the starting tank must be closed and the main starting valve is to be repaired as soon as possible. In case of emergency this work can be done while the engine is running. The safety valve is set at 25 atmospheres.

(18) AIR TANKS.

The air tanks are to be inspected and cleaned inside once a year If no special instructions are to be given for the air-pressure tanks they are to be tested out yearly at 225 atmospheres.

As it is very important that the valves on the air tanks are perfectly tight, the valves and their seats must be carefully inspected and if damaged replaced as soon as they show any leaks.

The valves are to be set up lightly, as when they are set up very hard the seats are damaged and soon leak. Damaged seats are to be

smoothed off with a steel milling cutter. The seating surface must, however, not be too broad, as a smaller seat holds better than a large one.

(19) EXHAUST LEADS AND MUFFLER.

These are to be inspected every four to six months, and cleaned if necessary.

(20) AIR INTAKE CHAMBERS.

The slots in the air intake chambers for the main cylinders in the air pump are to be kept clean so that the indrawn air is not constricted.

When the air is constricted, efficiency of the engine is cut down. Besides this the temperature in the cylinders is considerably higher, which causes damage to the exhaust valve seats and also after a time causes heat scratches (warmerissen ?) in the cylinder heads of the pistons.

(21) LUBRICATING OIL PUMP.

When the lubricating oil pump works badly or fails often, it is a sign that there are either leaks in the suction leads or that the valves of the pump are stuck. The latter must be inspected at least every three to four months.

(22) LUBRICATING OIL FILTERS.

The two filters must be, as a rule, cut in parallel, so that the loss of pressure is as small as possible. Loss of pressure should not be more than 0.3 atmosphere, otherwise the sieves break down. After 12 to 24 hours' service (according to the quality of the lubricating oil), the filters are to be taken down and thoroughly cleaned. As the filters are so big, one filter is sufficient for full load; this work can be done while the engine is running. The three-way cocks on the intake and discharge are so set that first one and then the other filter is cut out.

The cleaning of the sieves can best be done by brushing with fuel oil. Lubricating oil flows through the sieve from outside to the inside and goes from there to the engine. Great care must, therefore, be taken to prevent dirt from getting inside.

As soon as the cleaning is completed the three-way cock is again set in the parallel position.

Damaged sieves must be immediately repaired or replaced.

(23) LUBRICATION.

The strainer in the lubricating oil service tank should be cleaned about every 50 service hours. The service tank should be cleaned every 8 to 10 weeks. The oil cooler must be cleaned as soon as it fails to cool properly; in any case, every three to four months.

The inside of the base plates must be cleaned every three to four months. All oil pipes and oil passages must be blown out with steam at least once a year.

(24) CIRCULATING WATER PUMP.

The stuffing boxes are from time to time to be carefully and equally drawn up and to be kept in such condition that no water leaks out. Care must be taken to see that the leads from the glass (laterne?) to the bilge are not stopped up, so that the water leaking through the stuffing boxes is not mixed with oil.

The valves are to be inspected every two months, and the pistons every six months. The dismounting of the drive shaft for the circulating pump is described under fuel-oil pump. After dismounting the drive shaft the pump pistons can be drawn out through the top by dismounting the stuffing boxes and the upper packing rings.

(25) WATER JACKET.

In longer or shorter time—according to the quality of the water—the water jackets become coated. The coating may reach such an extent that on account of improper cooling great strains are set up in the cylinder heads, etc. All the cooling chambers must therefore be carefully inspected and cleaned when necessary. The amount of time of the deposit on the water jackets is so varied that general instructions as to how often the jacket must be cleaned can not be given. As the engine is fitted with a large number of handhole plates the jackets are easily inspected. Every time the cylinder head is taken the water jackets must be inspected, especially by screwing out the core hole plugs.

(26) FUEL TANKS.

The renewal of the filter cloths in the fuel filters depends naturally on the quality of the fuel oil.

In any case the filter cloths must be taken out every six weeks. Muslin has been found to work very well as a liner in the fuel oil filter.

All fuel oil tanks and fuel oil leads are to be emptied and carefully cleaned twice a year, if possible.

(27) ZINC LINERS.

All zinc liners are to be inspected from time to time and renewed whenever necessary. Zinc liners are to be found under the—

Handhole plates on the cylinders.
Cylinder cover and air cooler housing.
On the upper and lower cover of the oil cooler.
On the four lower flanges of the exhaust manifold.
On the four flanges of the muffler and lower end of the water discharge pipe into the exhaust valve housing and on blank flange in the intake chamber of the circulating pump.

XI. INTERRUPTIONS OF SERVICE.

To avoid interruptions in service it is most important to follow out exactly the foregoing instructions.

The irregularities of running occur at starting or immediately afterwards. First of all these service instructions are to be followed so that each step therein described has been properly carried out. Haphazard testing is to be strictly avoided. When any kind of irregularity occurs, the motor, if possible, must be stopped at once and only started after investigation and remedy of the cause of the trouble.

The following disturbances may occur:

A. The Motor Does Not Start or Runs Badly.

(*a*) *The motor will not start or backfires.*

Causes.

1. One or more of the starting valves stick in their guides or leak badly. (See under starting valves.)

2. There is water in the combustion chamber of one or more cylinders.

(*b*) *The motor makes a few turns and then stops.* A blowing back occurs in the intake chambers as long as the engine is turning over.

Causes.

1. The exhaust lead cut-offs are not open or the exhaust leads are badly stopped up.

2. One of the starting valves may have stuck open.

(*c*) *The motor attains its proper revolutions per minute by means of the air pressure, but when the starting lever is put into running position no firing occurs.*

Causes.

(1) There was no fuel in the vaporizers. In such a case when there is sufficient pressure in the starting tank the engine may be started several times with air pressure so that the fuel-oil pump fills up the leads. Otherwise the fuel may be pumped into the vaporizers by hand (see p. 55). When on starting there is sufficient fuel in the vaporizers and no explosion occurs, then a white vapor will issue from the test cocks on the exhaust manifold. In this case the trouble is to be looked for elsewhere.

2. The spray air pressure is too low. Either the spray air pressure reducing valve is not set properly or is stuck in its guides or the pressure valve is not in order or the valve in the spray air tank is not open. When starting, watch the gauge.

3. There is water in the fuel oil. The leads are to be emptied. The water is to be let out of the tank by the drain cock fitted for that purpose, and the leads are to be filled by hand up to the fuel-oil valves. (See p. 55.)

4. The engine is too cold when the temperature is very low in the engine room and the flash point of the fuel is fairly high. It sometimes happens that the temperature required for spontaneous combustion of the fuel oil is not attained. In such case it will be found advisable to help the starting with electric motor (see p. 39). Turning over the engine warms it up so that when after one or two minutes the fuel-oil pumps are cut in the engine starts to fire immediately.

B. The Engine Will Not Start.

Causes.

1. The fuel-oil tank is emptied, or a cock in the suction lead is closed.

2. There is water in the fuel oil.

3. The spray air pressure is too low on account of failure of the spray air pressure regulator or the pump (see p. 67). Failures of the air pump can always be detected by the blowing off of the safety valves in the intermediate stages.

4. A piston has seized.

C. The Efficiency of the Engine Diminishes; the Revolutions Per Minute Diminish.

Causes.

1. The spray air pressure is too low. (See under "B–3.")

2. The float valve admits too little fuel (lever 1 and float chamber too low) so that the fuel-oil pump sucks in air with the fuel.

3. A piston is beginning to seize.

4. A fuel-oil valve sticks. In such cases heavy explosions take place in the corresponding cylinder.

5. An intake or exhaust valve has become very leaky.

6. One of the fuel-oil pumps works irregularly through the sticking or leaking of one of the valves.

7. The governor springs have become weak (test out the no load revolutions per minute) or the governor gear is not properly adjusted or sticks (see page 57).

D. Missing of One or More Cylinders.

Causes.

1. Cylinder in question is not receiving fuel on account of failure of the fuel-oil pump.

2. One of the valves in the cylinder head has stuck or become so leaky that the compression is not sufficiently high to give the temperature required for firing.

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3. One of the fuel-oil valves is not properly adjusted or for some reason or other does not open at all.

4. One of the fuel-oil valves does not close.

E. The Engine Knocks.

(*a*) *At the firing dead center.*

Causes.

1. The spray air pressure is too high or the holes in the jets are too big.

2. The vaporizer is improperly adjusted.

3. A fuel-oil valve or a fuel-oil tappet is improperly adjusted or the stems have been changed so that strong premature or late explosions take place.

4. One of the fuel-oil valves leaks very badly or has stuck; in such cases strong explosions like gunfire take place and the safety valves blow badly. The motor must be stopped at once and the fuel-oil valve repaired.

5. The fuel oil is unsuitable.

(*b*) *Knocks at each revolution.*

Causes.

1. One of the main pistons, one of the air pumps, or some bearing is beginning to get too hot or to seize on account of faulty lubrication or on account of dirt. The engine must be stopped at once and carefully inspected.

2. A piston or a bearing has too much play. The bearing must be set up. If the play of the piston has become so great in time that a strong knocking is heard, the piston must be replaced.

F. The Exhaust Becomes Cloudy.

Causes.

1. The motor is overloaded.

2. The spray air pressure is too low.

3. The fuel oil valve leaks or has become warped.

4. One of the valves in the cylinder head leaks badly.

5. The vaporizer is dirty.

6. The jet-hole plates have come together.

7. The fuel oil is unsuitable. When, after several hours' service, the exhaust becomes visible, the fuel oil may be considered as not very good. In such cases whenever the engine is stopped, jets and the vaporizer are to be carefully cleaned.

8. The exhaust leads have become stopped up by carbon or foreign body.

9. The intake slots are so dirty that the air is considerably restricted. (See p. 57.)

10. One or more of the rocker-arm rollers are running off the cam. (Take up the play.)

11. The individual cylinders are not carrying the same load, which is caused by one cylinder receiving more fuel oil than the other. (See adjustment of fuel oil pump, pp. 55 and 56.)

G. The Air Pump Does Not Work Properly. (See also p. 57.)

Causes.

1. The valves leak.
2. The valves have been considerably fouled and the cross section considerably cut down.
3. One of the valves is broken.
4. One of the valve springs is very much weakened or broken.
5. The valves are not properly assembled. (See p. 58.)
6. The pistons leak on account of sticking of the rings.
7. The air cooler is dirty.
8. The compression space of the pump is too great. (This can, however, only diminish the efficiency of the pump very slowly.)
9. The nest of pipes in the cooler leak.

H. One of the Main Pistons Leaks Badly.

Cause.—One or more of the piston rings are stuck on account of the use of unsuitable lubricating oil or too much lubrication. This can also be caused by considerable running of the motor light. The piston rings must be loosened and the slots cleaned out.

J. Safety Valves Do Not Stay Tight.

Cause.—The cause is either a leak in the seat or weakening of the spring. The valve must be ground in or the spring replaced. In no case must the safety valve be put out of operation by setting down on the set screw. (Compare however, p. 52.)

K. An Exhaust Valve Sticks.

Causes.

1. An exhaust valve sticks in its guide on account of the flange nuts having been set up too tight or through gumming, or carbon, which comes from running too much with a foul exhaust. The exhaust valve must be immediately replaced with a spare valve. If it is not possible to stop the motor the valve guide may be lubricated with the fuel oil, but the valve must not be run very long under these conditions.
2. A spring may be broken. Further instructions are given under "upkeep."

3. Where troubles with various auxiliaries may be found, as for example when the air is discharged from the air cooler at too high a temperature or when a relief valve in the cylinder cover blows off.

XII. SPARE PARTS AND SUPPLIES.

All tools, spare parts, and supplies for the engine must be kept in good order and stowed in the proper place.

The spare parts must be well greased or properly covered with an antirust compound. Cup grease, tallow, emery, etc., must be kept in well-sealed tin boxes. Care must be taken to have on hand sufficient supply of spare parts, gaskets, and grinding compound.

An exact inventory must be kept of the spare parts belonging to each boat. The tools and keys necessary for each engine are marked with numbers which correspond to the numbers in the tables which have been provided. From this table the use of each special tool is determined.

INTERNATIONAL CONDITIONS.

POLITICAL AND ECONOMIC SITUATION IN SOVIET RUSSIA.

Source: Reliable.

10 April 1919.

(11198 D.)

The supreme political power in Soviet Russia still remains in the hands of Lenin and Trotsky. While ostensibly the relations between the two leaders is harmonious, there are many indications that friction exists. This is due to the divergency of their views respecting the future policy of the soviets.

Lenin is the originator of the basic plan of the Sovietsky government, soviet committees, committees of village poverty, and other cogs in the soviet machine. In spite of this he may be said to possess a certain amount of toleration for other parties, notably the Extreme Lefts of the Social Revolutionary party. He stands for comparative conservatism, if there can be said to be anything conservative about the Bolshevik party.

Trotsky, on the other hand, stands for the absolute and supreme power of the Bolshevik party and the extermination of all other parties. He is the personification of radicalism, a protagonist of terrorism and is back of all the atrocities of the executive committees.

A third figure of growing political importance is the Jew, Zinovieff. On the evacuation of Petrograd by the Soviet government and its removal to Moscow, Petrograd and all the northern Provinces were formed, for the purpose of government, into the Union of Communes for the northern district. To the chairmanship of this union was appointed Zinovieff. This man has taken advantage of the position to advance his power and influence, and by so doing has incurred the suspicions of Trotsky. Seeking the curbing of Zinovieff's power, Trotsky engineered a move which crystallized in the third session of the union, held last month (February), when the abolishment of the union was decided upon and the decision taken that thereafter the northern districts would be governed from Moscow.

Within Soviet Russia there is one other party which still has some pretense to organization and of opposition to the Bolsheviks. This is the party of the Social Revolutionists.

The chief doctrinal difference between the two parties is found in their attitude toward the ownership of property, the Bolsheviks standing for the nationalization of all property, the Social Revolutionists for the ownership of property by the proletariat only. The tendency of the latter party is toward extreme socialism.

The leaders of the Social Revolutionist Party are Savinkoff, former commissary of military affairs under the Kerensky government, and the Jew, Kameneff, arrested during the current month (March).

During the summer of 1918 the party had some pretense of military strength, which found voice in the attempted coup following the Mirbach assassination. Succeeding the attempted coup, for a time it seemed there might be a compromise between the two parties. There was even permitted the publication of the Social Revolutionary organ, Always Forward. The time for such a compromise has passed. Recently there has occurred a complete breach of relations, and the Social Revolutionists are now violently opposed to the Bolsheviks. At present the party is without any definite military support, but, through their propaganda, they have gained considerable strength among the sailors and lately have gained many recruits among the workmen. The recent strike in Petrograd at Poutilovsky Works was due to their agitation. On the whole, it may be said they are growing in strength and probably numerically now exceed the Bolsheviks, though, of course, they have not the material strength.

The Bolshevik government is essentially a government of and by force. It owes its continued existence to the Red Army. In order to retain the support of this army, extraordinary privileges are granted the soldier. He is permitted a special allowance of food, greater than that permitted any other class. His family is furnished with money and he has special elective privileges.

Second to the soldier in privileges is the workman. Lately, however, his privileges have been somewhat curtailed. As a result there have been many strikes and much sabotage, and at present the Bolsheviks have not nearly the strength with the workmen which they possessed six months ago.

At the inception of the Bolshevik movement some support was had from the peasants, who were drawn to the party by the promise of land distribution. This support has now been entirely alienated. To-day the peasant is bitterly opposed to the Bolshevik party and policies. It is true, perhaps, that in the matter of land he is better off than formerly, but his live stock and products have been requisitioned without compensation and his home and village pillaged by the Red Army. In countless numbers there have occurred, and are occurring, bloody conflicts all over Russia between the peasants and the Red Army.

Considering, then, the dissatisfaction in the army, the falling off of the workmen's support, and the total lack of support from the peasant class, it may be conservatively estimated that to-day not more than 12 per cent of the population of Soviet Russia favor the Bolshevik cause.

Economically Russia accurately reflects the powers which rule it. Trade, commerce, and production are at a standstill, justice non-extant, life and property without protection, and crime rampant.

The currency has depreciated to the point where the ruble has now approximately the value which the kopeck formerly had. All banks have long since been nationalized; all metal money retired from circulation. Deposits have been practically confiscated, though at present a limited amount—500 rubles per month—may be withdrawn by depositors. Paper money is printed in unlimited quantities with absolutely no gold or other reserve back of it, and there is now not even an attempt at numbering or recording the notes. For a time the plates of the so-called Tzarsky (old régime) notes could not be found, and as a consequence this money was at a premium, both in Russia and abroad. In January of the present year, however, the plates were discovered, and these notes are now printed in as great quantities as the Kerensky and soviet money, and are as worthless. There is an exception in the case of the 100-ruble note. The plate of this, it is believed, has been destroyed; at least thus far the Soviet Government has not issued this note.

Because of the worthlessness of the currency, as well as because of the nationalization of all industries, there is a complete cessation of all private enterprises in Russia. No private corporations or companies are being organized and those formerly in operation no longer function. The only factories operating to-day are those engaged in the production of munitions and the repair shops for steam locomotives. Of the former, not more than 50 are operating, the chief of which is the Ijevsky Works, near Petrograd. The munitions produced are very inferior and unreliable. There are five locomotive works in operation, the principal one being the Kolomensky Works, near Moscow. Their combined production for 1918 was 197 locomotives, as against 520 in 1917. Indications are that less than 50 locomotives will be produced during the current year.

Due to the lack of repair to the rolling stock and the rights of way of the railroads, railroad traffic is in a deplorable state. In February of this year there had already ceased running the railroads Koursky, Saratov-Zlatoustky, Volga-Bougoulminsky, and the confidential report of the commissary for railroads, just stolen, predicts the entire stoppage of railroad traffic. For a month past passenger traffic has been forbidden on railroads.

The telegraph in Russia is in operation for private as well as official telegrams but no cipher wires are permitted unless bearing the Bolshevik seal. There is, however, no certainty to the service; for example, it frequently takes five days for the delivery of a telegram from Moscow to Petrograd. Communication with all other countries is cut off save by the wireless station at Zarsky Salo, and this station is used entirely for spreading propaganda abroad. The Moscow wireless station is in communication with the Ukraine. The Vologda wireless station is out of commission.

The postal service has ceased to function. Stamps have been abolished. Theoretically, mail may be forwarded, but actually it is not moved and communication by letter is had by forwarding it through the railway guards.

Courts, in the general acceptation of the term, do not now exist in Russia. Their position has been usurped by the so-called revolutionary tribunals. The two highest are the Supreme Revolutionary Tribunals, one division sitting in Moscow, the other in Petrograd. Theoretically, these are tribunals of appellate jurisdiction. As a matter of fact, there is no record of an appeal ever having been allowed to them. The lowest tribunals are the region tribunals, which exist in all cities and towns. Between these two are the city tribunals, existing only in large cities. This is the theoretical judiciary system of the Bolsheviks. Actually 90 per cent of all cases—civil, criminal, and political—are heard by the extraordinary commission against counter revolution, branches of which exist in every city and town. The powers of these commissions are absolute and without limit. A vast majority of the cases heard are "political" cases, under which are included any which may be construed to involve anti-Bolshevik sentiment. The tribunals possess the power to sentence to death (these sentences being executed by shooting), which power they exercise to the point of terrorism. They possess the power of issuing writs for indiscriminate search and for the confiscation of property. Their decrees are without appeal; their sessions are secret and their victims countless.

The decrees of the above commission are published in the newspapers, but so multitudinous are they and so contradictory no man can hope to say which decrees are in force. All newspapers save the Bolshevik organs have been forbidden the right of issue since the summer of 1918. The one exception was the Social-Revolutionary paper referred to earlier in this report. These papers publish mostly Bolshevik propaganda, distorted reports of Bolshevik victories, and a very limited amount of foreign news, largely unauthentic. Two classes of advertising are permitted, theatrical advertising and medical advertising, the latter largely relating to venereal diseases.

The population of Russia is ravaged by disease. The death rate, especially in the cities, is appalling. For example, in Petrograd, for the month of February, as shown by confidential statistics, there were 113,000 deaths. Typhus and smallpox are epidemic. The population, weakened by hunger, fall ready victims. Starvation claims a large percentage, chiefly among the bourgeoise, who are shut off from all food distribution. Venereal disease is spreading with alarming rapidity. There are no medicines. Anesthetics, with the exception of a very limited amount of cocaine, are exhausted. All hospitals are overcrowded and private wards have been abolished. There are no more coffins. Bodies are taken to the cemeteries in plain boxes or bags, which are brought back for repeated use. It has been found impossible to keep pace with the death rate, and often bodies lie unburied for several weeks. With the coming of warm weather the decaying of these bodies will constitute a terrible menace to health. Cholera, too, will undoubtedly then become epidemic.

Religion, of whatever sect or denomination, has been abolished by Bolshevik decree. The celebration of mass has been forbidden. Many churches have been looted and desecrated, the edifices in some instances having been converted into theaters or dancing places. Many priests have been murdered. All church realty has been declared forfeited. The marriage ceremony as a religious rite has been abolished. Both marriage and divorce are now under the jurisdiction of civil commissaries. Nationalization of women has been decreed and free love legalized. No records are kept of marriages, births, or divorces.

Education, except in the most elementary sense, is not now attempted in Russia. All universities, technical schools, and professional schools are closed. The high schools and academies are also shut. The gymnasiums and grammar schools are open and have been made coeducational. They are under the superintendence of commissaries appointed to see that the Bolshevik doctrines are taught. The teaching of any religion in the schools is forbidden.

As to the continued duration of the present state of affairs in Russia, it is impossible to predict. It may be definitely asserted, however, that the regeneration of Russia will never come from the inside. Matters can only grow worse. There is no power of self-healing. The remedy must be an external one.

GERMAN SITUATION AT END OF FEBRUARY, 1919.

Source: Reliable.

24 February 1919.

(11328.)

The present Government holds the majority by a political combination of the Moderate Socialist and the German Democratic Parties.

Had the Moderate Socialist Party been able to work out the destiny of the country alone it would have probably declared for a policy of internal reforms and socialization of certain industries looking to the reestablishment of a sound economic condition, if such a thing were possible. In order to have a working majority in the Constituent Assembly the Moderate Socialists had to form a voting combination with the German Democratic Party, which, although it has announced a liberal party platform, is controlled by men of ambitious character who before the revolution stood for Pan-Germanism. Those most in evidence in this party at Weimer have been Neuman (the central Europe doctrinaire), Bernstorff, Dernberg, Theodore Wolf, etc.

In general there is no change in the viewpoint that the war had been properly conducted by Germany. The systematic removal or destruction of industrial machinery from Belgium, France, and Poland is still referred to as a war necessity, while suggestion for restitution and restoration are met with the assertion that if the Allied nations bring industrial pressure on Germany it will drive her into Bolshevism.

The cry of Bolshevism is the propaganda of the present day. It is the card which the German peace delegation expect to use at the conference to get them advantageous treatment.

To Germans a "just peace" means restoration of prewar conditions for Germany in commercial and territorial matters.

To the influences of the German Democratic Party may be attributed the sudden reawakening of policies, such as the demands for the return of the colonies, the return of the Province of Posen, the plebiscite for Alsace-Lorraine, all of which came greatly to the fore both at Weimar and in the press shortly after the Constituent Assembly had met.

I attribute the demand for the vote in Alsace-Lorraine as a political maneuver to enable, at some future time, a claim to be raised that these Provinces were never given the right of self-determination, but were torn from Germany by force of arms. All parties are in accord on one subject—that German-Austria must join Germany.

To preserve the policies of the Moderate Socialists in the Government there had developed in Germany but few men of outstanding ability. Auer, who has just been assassinated at Munich; Noske, who has put down Spartacist uprisings; and Ebert appear to be the leaders of those who genuinely seek for higher political ideals for Germany. Scheidmann's sincerity as a reformer is open to question. Brockdorff-Rantzau is of the old school of German diplomacy. He is closely allied with Bernstorff. As advisor to the Ebert-Scheidmann Government in their dealings with the allied nations

and America he shows a failure to realize that times have changed from those when German influence was powerful in the world.

The Independent Socialist Party under Haase will not cooperate with the Government and attacks it bitterly on nearly all occasions. It is a growing party, but one whose influences are destructive.

To say that a new spirit has grown up in Germany as a result of the war would be going too far at present. There is profound depression for the future outlook. There is also a spirit of complaint and whining which sits ill on a nation with such a record.

The foreign office, under Brockdorff-Rantzau, is a greater factor in the Government now than in the past, having acquired those powers formerly under control of the political section of the General Staff of the Army.

The people themselves show an undeveloped political sense. It may be too much to expect from the present generation that new ideals should have taken root, but the political instability of the people leaves Germany in a state of flux from which disorder is likely to develop.

There are no signs at present of a desire for a return of the Hohenzollerns, but there are many people who think Germany will be stable only as a limited monarchy. For the time being such a development need not be considered. The struggle is between democracy and Bolshevism.

The food conditions in Germany have been carefully gone over by Dr. Alonzo Taylor and Mr. Vernon Kellogg, of Mr. Hoover's staff. A British commission has also covered the same ground. There is substantial agreement that the present food ration will have to be greatly reduced by the end of March, unless large importations of food are arranged at once. To give the people two-thirds of the normal ration will be about the maximum that can be arranged for under any conditions. This year's crop can not be reckoned as more than half the normal, and the probabilities of getting agriculture on its old basis for the next year is slight. This means large purchases of food abroad by a country whose finances are in a desperate condition.

Before the war Germany made in industrial pursuits great sums which went to support her population. The prospect for the revival of this is remote. The development in those lines of industry in America and England, which, before the war, formed Germany's chief sources of income, are such as largely to preclude Germany, under her present condition, from competing in the world's market. Her financial resources, which must be curtailed for restoration of destroyed areas and for reparation for illegal acts, are not sufficient to finance great manufacturing ventures and to provide the raw

stuffs to start them. The chance for her shipping being available to move overseas freight in the interests of her own producers is remote. That important asset of "good will" is lacking generally throughout the world, and the great Russian market for her goods is, for the present, unable to absorb manufactured articles if such could be produced.

At present unemployment in Berlin is reckoned at 325,000, and in other cities it has reached large numbers, and unemployment is on the increase everywhere. The Government is paying a high-living allowance to the unemployed. The Government realizes that it is creating a financially impossible situation, but frankly states that they can not at this time afford to withdraw or decrease these allowances, as further rioting and bloodshed would lead to its overthrow.

No government, however vigorous and long established, can stand against economic conditions such as these, unless there is conviction among the people that conditions will eventually be ameliorated. Considering the world's decreased power to absorb goods, it is not easy to see how, with justice to the allied nations, Germany can employ and feed her industrial population. There are twenty-five or thirty million of excess population over what she can maintain from an agricultural standpoint.

The people of the cities show their underfeeding by their pallor and leanness. In general, they are apathetic. There is no desire for further war. Those who are ready for disorder are found in the classes who have nothing to lose by plunging the country into the horrors of class warfare. In the Spartacist uprising of January the Government had at first no force at its disposal. At one time they were at the point of abandoning the Government offices to the Spartacists and seeking safety in flight.

The Gurstenberg and Reinhart regiments, hastily raised by their leaders and highly paid by the Government, saved the situation. Their personnel were recruited from citizens, officers out of employment—some of whom served in the ranks—and such others as would serve for the adventure or for patriotic reasons. Gen. Von Luttwitz, who is trusted by the new government in Berlin, has general supervision over these regiments, which have recently done good work in suppressing the disorders in Hamburg and Bremen, as well as keeping order in Berlin; but the number of troops available under this system and their prolonged loyalty under adverse conditions is a matter which only the future can tell.

The old army organization, now known as the "Corps Soldaten," is stated by the Government to be about 200,000 men, with Hindenberg as chief of the General Staff in command. Discipline has gone down greatly. The Russian influence is at work on the soldiers on

the eastern frontier. From what I could gather this force would not prove a danger to troops disciplined and well supplied. If Germany should become a Bolshevist State, they might form a nucleus for a force seeking to extend that creed to the west, but for the present they are not an effective fighting force.

The general apathy of those classes of the people who are usually the backbone of a nation is a danger to stability which must be recognized. A general loosening of both morale and morals is clearly observable. Crime of all sorts is greatly on the increase.

A reasonable discussion of the situation of Germany from any point of view is rarely to be found in the press. There are many newspapers devoted to minor political maneuvers, abuse of the Allied Governments for their demands, and of the German armistice commission for their acceptance of such demands. The press, as well as the people, appears to have no idea of the present position of Germany in the world. They fail to understand that even with the peace treaty signed Germans can not take their old position and be received as if nothing had happened to make them unacceptable in both business and social relations. The old idea that Germans will one day control the world is not in evidence, but it still exists among the intellectuals. To this end the German democratic party seeks to hold the old boundaries and colonies and annex German-Austria. To deal with her justly with regard to the economic necessities of the present and to prevent a rebuilding of the policies of domination is the problem of the moment.

The question of the survival of the present German Government depends on the economic conditions which the immediate future will present. Those matters relating to colonies, boundary lines, return of prisoners of war, etc., have little relation to Bolshevism in Germany, although politicians and a large section of the press attempt to unite them with that issue.

With all the undesirable points of the present Government in Germany it appears to contain about all of the political ability that is available at the present time. The total collapse of the Ebert-Scheidemann Government would leave the country in a state of anarchy, which would enable the Bolshevist movement to take possession, and Bolshevism is as possible for a disorganized Germany as it was for a disorganized Russia.

There was evidence in Berlin that Germany counted on differences between the Allies and the United States to bring advantages in the peace terms to herself.

CONDITIONS IN GERMANY, FINLAND, AND MEXICO.

Source: Reliable.

26 May 1919.

(10911–G.)

GERMANY.

Concerning the German dye industry, the director general of the "Elberfelder Farben-Fabrik" announces that this industry has preserved only 40 per cent of its earlier production. The rest has gone to foreigners. He predicts that the German chemists will undoubtedly lead the industry into new fields so that Germany will be able to recapture the deficit of 60 per cent.

FINLAND.

It is rumored that German agents have been sent to Finland for the purpose of creating internal dissensions which would result in the Finnish army being called back from the front.

MEXICO.

Although the Villistas need all the ammunition they can obtain, their representatives north of the border hesitate to attempt further expeditions into Mexico on account of the recent convictions of their former associates by the United States courts.

Villista bands are now reported all through Chihuahua, and in many parts of Coahuila and Durango. One column of rebels is reported on its way toward Ojinaga, opposite Presidio, Tex., where Gen. Albino Arranda, a Villista, who has more than 200 men at Palmos, Chihuahua, near the Coahuila line, will join in an attack on Col. Cevallos and his garrison. On May 7, a band of Villistas under Martin Lopez was 14 miles east of Santa Eulalia. On the same day another band of rebels was reported at Satevo, 50 miles south of Chihuahua City.

Gen. Ricaut in Monterey is authority for the statement that on May 10 Juan Andrew Almazan and his band passed through Aldamas, Nuevo Leon, going north. Aldamas is on the San Juan River near the Nuevo Leon-Tamaulipas line.

Gen. Luis Caballero is reported to be encamped within 30 miles of Victoria, Tamaulipas, with 400 well-equipped men.

Gens. Cavazos and Miranda with 1,200 men succeeded in forming a junction with Gen. Peleaz in the State of Vera Cruz on May 9. Peleaz is now said to have 9,000 well-equipped men abundantly supplied with ammunition, which was recently landed near Tuxpam. Gen. Angeles is reported to be contemplating a visit to Peleaz for a conference with a view of obtaining organized cooperation between Paleaz and Villa.

All chances for a Felicista-Pelascista coalition is said to have disappeared.

El Universal of Mexico City published on May 10 that Gen. Manuel Mondragon, an ex-Federal general, has landed on the coast of Vera Cruz and will occupy the place left vacant in the Felicista ranks by the death of Gen. Blanquet.

The Mexican press explained the difficulty between the Mexican Government and Admiral Lovatelli of the Italian Navy by quoting the foreign office as saying that word had been received from the military authorities at Tampico to the effect that a stranger named Lovatelli had traversed the rebel regions around Tampico and then proceeded to Mexico City. "This suspicious circumstance" had been the cause of the military authorities' request that he report to them and concluded by stating that "This disagreeable incident would never have happened had the department of relations been notified of his presence in the city." This explanation is rather weak compared with the statement by the Italian legation to the effect that Admiral Lovatelli had entered the Republic with a passport viséed by Ambassador Bonillas in Washington, which he presented to the customs and immigration authorities at Tampico upon his arrival, and that during his visit in Tampico Admiral Lovatelli had been introduced to various military officers of high rank.

It is said that an election riot occurred on April 28 in the State of Campeche upon the arrival of Gen. Fernando Estrade, candidate for governor of that State. Shots were fired and several persons injured. Gen. Estrade and his companions had to seek refuge in the French consulate.

The departure has been announced in Mexico City of Col. Paulino Fontes for the United States, where he goes for the purpose of purchasing rolling stocks for the railroads under his control.

Col. Federic Berber, of the staff of Gen. Manuel Dieguez, left Gaudalajara, Jalisco, May 5, with 500 men of the Thirty-sixth Battalion for Chihuahua City.

Seventy-five men of the Eighteenth Cavalry arrived in Nuevo Laredo May 7. The Eighteenth Cavalry was formerly at Nuevo Laredo but was sent to Monterey some time ago for reorganization and reequipment. These troops have returned in good condition, well disciplined, well uniformed, and well armed.

Gen. J. Magana, the Federal garrison commander at Tampico, has been appointed chief of police there. Gen. Magana is said to be a desperate character, that he does not pretend to control his men, and that most of the robberies in the Tampico district during April were committed by Federal soldiers who went unpunished. Gen. Magana evidently sanctioned this lawlessness.

A band of outlaws, number unknown, passed through Morales, a town 35 miles south of the international border, near Douglas, Ariz., going east.

The oil companies of the Tampico district pay the Pelaecistas about $65,000 a month for protection, which sum approximately covers the pay roll of the Pelaescista army.

Trouble is anticipated along the border in the vicinity of Nogales, arising on account of the authorities of Nogales, Sonora, having removed the ban on the sale of liquor in that city.

The Carrancista government is reported to control less than one-tenth of the State and population of Oaxaca. Since the portion of the State has been under the agents of Carranza, the record has been one full of crime. Not one of the number of gold, silver, copper, and other mines that in normal times ship millions of dollars worth of ores to the smelters in northern Mexico is being operated.

Orders have been issued to Gen. Angeles by Villa to capture the Ojinaga smelters. He has been furnished 2,000 men for this purpose. Villa is now estimated to have 5,000 men at his disposal.

According to the statement of a man formerly a major in the Villista forces, Villa is receiving assistance from abroad and is now in a position to accomplish something. He would not state from what quarter Villa obtained his foreign assistance, but declared it did not come from the United States.

It is now learned that the troops under Gen. Bruno Neira, who arrived recently at Piedras Negras, are the development of a plan originated by the government of Coahuila to exterminate the small bands of Villistas reported operating in the Big Bend district. Fifty trucks have been purchased as a means of transportation for these troops. It is planned to dispatch the command 50 miles north along the Rio Grande to Las Vacas and thence westward into the bandit country. The governor of Coahuila was to have arrived about May 22 at Piedras Negras to confer with Gen. Neira regarding the expedition.

ORDNANCE.

ARMOR ON BRITISH WARSHIPS.

Source: Reliable.

8 April 1919.

(21056–808.)

The following information has been received relative to the principal features of the armor protection of British battleships and battle cruisers:

	Queen Elizabeth class.	*Royal Sovereign* class.	Battle cruiser *Tiger*.	*Repulse* and *Renown*.
Main belt:				
Width	16′	13′		9′.
Thickness	13″ at load water line, tapering to 8″ at bottom and 6″ at top; main belt tapers to 6″ forward and 4″ aft.	13″ entire width, tapering 6″ forward and 4″ aft.	9″ amidships, 4″ at ends.	6″ amidships, 4″ forward, 3″ aft.
Depth below load water line.	4′	5′		
Upper casemate	6″ around 6″ guns	Upper casemate, 6″ between upper and forecastle decks.	6″	None fitted.
Lower casemate		Lower casemate between main and upper decks 6″.	6″	
Barbettes	10″ to 4″	10″ to 4″	9″ to 3″	9″ to 7″.
Turrets	11″	11″	9″	7″.
Turret roofs	4½″	4½″	4″	4″.
Conning tower	11″	11″	10″	10″.
Deck protection:				1½″.
Vertical plating	2″, 1″	1½″, 1″	2½″, 1½″, 1″	1½″.
Forecastle deck	1″	1″	1½″, 1″	1½″, 1⅛″.
Upper	2″ to 1¼″	1½″ to 1¼″	1½″, 1″	½″.
Main	1¼″ at ends	2″, 1½″, 1″	1″ at ends	3″ to 1″.
Middle	1″ amidships	2″ slope, main to middle.		
Lower	3″, 1″	1″, 2½″, 3″, 4″	3″, 1″	2½″.

In all of above classes, and also on *Crater* classes, 1 inch of deck protection on lower or middle deck was added after battle of Jutland. This was the only general change made. As result of experience in the battle of Jutland it is proposed to give *Repulse* and *Renown* 9-inch belt and 6-inch lower casemate and about 1 inch additional deck protection.

CERLETTI DELAYED-ACTION FUSE.

Source: Reliable.

2 May 1919.

(11648.)

The essential principle of the Cerletti fuse is the corrosive action of an acid on a metallic part; the eating away of this metallic part by the acid releasing the firing pin and exploding the shell. The duration of the delayed action is governed by the strength of the acid solution.

The secondary features of the invention, such as the safety device and the arrangement which enables the fuse to act as a delayed action percussion fuse applied to the 68 model for French shells (Art. VI), are very ingenious, carefully elaborated, and contain interesting principles possibly capable of very extended applications.

The elements of safety in handling, certainty and regularity in action, claimed for this fuse are valuable and appear to be attained in theory.

The invention appears to contain a possible application for illuminating objects at night by the use of flare shells, possibly capable of coming to the surface, floating, and illuminating a restricted area during a limited period.

It also appears to contain a possible application in civil engineering for the explosion of large blasts or successive blasts.

The apparent value of this invention and its careful and ingenious elaboration seem to render it worthy of consideration.

The Italian delayed-action fuse is the property of Commandant Ugo Cerletti, of the Italian Army. A patent was taken out in September, 1916, for its protection. Before making any use of this invention it is believed an arrangement should be made with the inventor.

DELAYED-ACTION FUSES.

I. A delayed-action fuse was produced for the first time by Commandant Ugo Cerletti, of the Italian Army. He proposed it to his Government in a detailed memoir in September, 1916, and took out a patent relative to it in November of the same year.

In the memoir and the designs presented in September, 1916, there is to be found exactly explained the object and the means of effecting the invention; i. e., the device intended to produce the bursting of artillery projectiles, aviation bombs, etc., according to adjustment, after a more or less extended interval of time. The burst may take place equally well a few hours after or even several days after they have been fired. The invention may also be used for producing delayed explosion on the ground, in the same way as mines, in case of a voluntary retreat or abandonment of positions.

The problem is naturally much more complex for fuses having to be fired than for devices employed exclusively for causing explosion of shells which are not moving.

Among the numerous contrivances which he had proposed as a solution of the question, Commandant Cerletti directed his attention principally to those based on the chemical principle. The first chemical contrivances were made and tested as early as 1916. The first fuses for the artillery were fired with success in the .75 gun in March, 1917. After several alterations and numerous tests at proving grounds, resulting in the perfection of a single type, operating in all cannon, howitzers, and mortars at any degree of pressure and initial velocity of the projectile, the Italian Government pushed actively on the manufacture of this fuse on a vast scale for large as well as small calibers. A large number of fuses specially intended for aeronautic bombs was also manufactured.

II. The essential part of the construction of the delaying device of the first fuses was a firing pin holding compressed a spring held back by a stem made of metal (steel, copper, zinc, etc.) or some other substance. This stem was designed to be eaten away within a fixed time by a suitable liquid.

The fuse adopted by the Italian Artillery for average and large calibers is made up (1) of the delaying device, (2) of the safety device.

1. *The delaying mechanism.*—The *firing pin* holds the spiral *spring* pressed down, held by a *soluble washer*, which is screwed to the stem of the hammer by a small *screw*, the head of which is thinner than the stem of the firing pin. The washer is made of a special substance which is dissolved in a special liquid.

The upper *fuse plug* is unscrewed and the dissolving liquid poured into the *liquid chamber*. After a well-defined time, the washer is softened to such a degree that the pull of the spring becomes greater than the force of resistance, and the firing pin is released. The length of the delay may be regulated as desired by the employment of solvents of varying strength. The Italian Artillery has adopted 7 different durations of delay, ranging from 30 minutes to 24 hours. A very simple table of times gives the variations due to temperature and other causes.

2. Safety device.—The safety device is so constructed that it is absolutely impossible for the primer to be punctured before the shell has struck the objective. The primer case does not move during the transportation and on the departure of the shot, as it is held back by four spring hooks. When the shot reaches the ground the primer case is thrown forward by its moment of inertia and it pulls the hooks apart until it is fastened upon them in a new position, permitting the firing pin to puncture the primer.

If in an exceptional case the firing pin should fall before the shot reaches the objective, no harm would result; on reaching the objective the fuse acts as a percussion fuse, owing to the primer case being brought forward against the sharp end of the firing pin, which is stopped by its plate on the lower shoulder.

III. It was in 1917 that the German chemical delayed fuse (Lgz–Z–17) appeared. This fuse is not adapted for firing, but its use is limited to a single application—the simplest one: The blowing up, on the spot, with a longer or shorter delay, of ammunition stacked up after the fashion of mines in positions previously determined, or ammunition which it is found necessary to abandon during a retreat.

It is owing to this chemical fuse (which has often been incorrectly designated as "clockwork device") that the Germans were able to escape being encircled and to save the greater part of their armies and their material, to the value of several tens of thousands of millions of francs.

Now the German Lgz–Z–17 fuse, both mechanically and in its chemical reaction, is merely an exact copy of the first fuse made by Commandant Cerletti. If the design submitted by him to the military authorities in September, 1916, and described in the 1916 patent be compared with the design of the German fuse which appeared the following year, both the similarity of the principle and its application will be obvious.

But the mechanism and the chemical reaction of this first fuse do not offer the elements of safety and precision sufficient for the much more difficult problem of the fuse capable of being fired in guns. For this reason, Commandant Cerletti undertook at once the study of new contrivances and of a chemical reaction entirely different from the first.

The experiments with this new reaction began in 1916 and soon led to the practical solution of the problem as we have stated above.

IV. It was by utilizing this same reaction and by means of a device very similar to that of the Cerletti fuse, that Mr. MacAlpine began experiments in England a few months later, with a long-delayed action fuse (patented 14 May, 1917).

The practical results of these tests are not yet known.

V. In order to utilize fully the advantage over the enemy which might be effected by "surprise," the Italian Government had intended to begin using this new weapon on the front, only when it should be possible to obtain a common and simultaneous action by all the Allies. It therefore, about a year afterwards, informed the delegates of France, England, the United States, and Belgium, of the new fuse. The Supreme Interallied War Council was also informed in February, 1918.

Later on, in order to hasten the adoption of this new weapon by the Allies, Commandant Cerletti was sent on a mission to France in order to carry out a series of firings on the Bourges proving ground, in the presence of the French authorities. The fuse was adjusted so as to be entirely in accordance with the French armament specifications.

VI. *Description of the 68 Model for French Shells.*—The feature of this model is the safety device. By means of this device, absolute safety during transportation, and during the loading of the gun, and in particular a great sensitiveness in arming the primer case when the projectile reaches the ground, the necessity of which is demonstrated in firing on the soft ground of the French front, and in firing with trench mortars or with guns having reduced charges.

In this device the primer case is placed in a tube with hooks, in which are grouped four small tongue-pieces ending in hooks. These hooks catch the upper edge of the primer case and can not open out, as they are held in position by a ring or plunger kept in position by a spiral spring.

On the departure of the shot, the plunger slides downward, compressing the spring, and it remains caught by three tongues belonging to an outer tube with hooks. At the same instant the primer case recedes a little, pressing down the small lower spring, the express object of which is to absorb the shock of the recoil of the primer case.

During the flight of the projectile, the case thus remains fixed in position simply by the feeble pressure of the hooked tongues. On the shock of reaching the objective, the primer case is thrown forward, and causes the hooked tongues to separate. On reaching the end of its motion, the hooks of the tongues close up in the groove of the primer case and the latter remains fixed in the correct position for being struck by the firing pin.

VII. It should be observed, lastly, that the safety device with which the 68 model is provided, on account of its features of great security and of sensitiveness on reaching the objective, and the simplicity of its mechanical parts, may be used with advantage as the essential part of a percussion fuse.

VIII. *Applications of the Cerletti fuse.*—We have seen that the German Lgz–Z–17 fuse is designed for the simplest application of delayed-action bombs. It should be called *detonator* for mines rather than *fuse*. The Cerletti fuse, on the other hand, permits a number of applications which are incomparably more important. Not only may it be used for blowing up munition depots, but it may also be fired at the greatest distances with any artillery shell whatever, with trench artillery bombs equally as well as with aeronautic bombs, operating according to the adjustment with a delay ranging from a quarter of an hour to several days.

These properties make possible the most varied tactical uses, a few instances of which only will be mentioned here.

(*a*) As the firing may be done during the day in order to produce the effect at a predetermined time during the night or throughout the whole night, according to the adjustment, a number of applications are thus rendered possible for *night actions* which may in this way be kept up with the artillery by means of firing previously planned and executed. Two applications of great importance are *preventive or isolating fire* (tir d'interdiction) and *barrage directed against communications* (barrage des communications) during the night, as accurate firing may be executed by taking advantage of the daylight (without fear of betraying the batteries by the flare of the guns), so that all movement within the enemy lines will be checked by the explosions that will succeed one another throughout the night without any possibility of the enemy foreseeing the spot or the moment at which the explosions will occur. The constant employment of the projectiles fitted with the Cerletti fuse *renders life in the trenches impossible*, on account of the nervous strain and the demoralization which takes possession of the soldier who finds himself threatened night and day, without respite, by a danger from which there is no escape.

(*b*) Firing may be commenced several hours before an action, and continued, *accumulating* upon the objective an enormous number of projectiles and regulating the fuses so as to obtain all the bursts within a very short period of time. The actual result is thus *multiplied* and while it is being produced the gunners *remain free* to carry out other actions.

(*c*) Facility is given for utilizing much better than has been done up to the present, and for mutliplying the work of the artillery. For instance, during the counterfire of the battery engaging the artillery in an attack, delayed shells may be used together with ordinary shells, so that when the artillery is required for other actions, for instance for attacking in conjunction with the infantry, the counterfire of the battery engaging the artillery may be continued, as it were by itself, *automatically* by the bursting of the shells previously fired.

(*d*) A bombardment of railway stations, or of centres of communications by airplanes, with the new bombs, has the effect of *preventing all movement and traffic* until the last bombs have burst; that is to say, for several hours, or even for several days.

(*e*) There is no need to illustrate the application to barrage mines and destruction mines. The advantage derived therefrom by the Germans has surpassed the most modest anticipations.

(*f*) The Italian technical authorities have also considered the application of the Cerletti devices to marine mines, either mines dropped in the wake of a fleet as it is retreating, and which must

become harmless after a certain time, or floating mines dropped in the ports by airplanes and intended to explode after they have reached a definite depth in the water, or else for other uses of great importance.

(*g*) In order to assure the navigation of a fleet at night along coasts without beacons a few illuminating projectiles may be fired during the day, exactly on the points previously located, so as to burst at the desired moment during the night.

(*h*) The Cerletti devices—simple detonators and fuses—have already been applied to most different uses at proving grounds in experiments and in acceptance tests for material, for all cases in which it is of advantage to produce the bursting of shells fired or lying on the ground, or explosives, mines, etc., with a certain delay.

(*i*) Finally, the Cerletti devices are capable of important applications also for the ordinary works of peace. The detonator which bursts regularly, according to the adjustment, from a quarter of an hour to several days afterwards, and is sold for a very moderate price, may be advantageously employed for firing mines in all industrial works.

MACHINE PISTOL—GERMAN.

Source: French Report on Enemy Munitions.

1 December 1918.

This pistol is a light automatic arm which was recently put into service in the German Army and which makes short rafales at small distances possible.

It fires 9 mm. long pistol, Mod. 1908 cartridges, with magazine drum of 32 cartridges and is manufactured by the firm of Bergmann.

The characteristics of this arm are the following:

Caliber	9 mm. (exactly 8.84).
Total length of arm	0.82 m.
Weight without drum magazine	4,250 kg.
Weight with drum magazine empty	4,930 kg.
Weight with drum magazine full	5,865 kg.
Number of rounds	32

These 32 rounds can be fired in 3.5 seconds.

The cartridge weighs 12.35 g., 8 for the ball and 0.37 for the powder.

It is known that this long pistol is also called Mod. 08/15 pistol and also n/.A new patterns.

This pistol is operated by the recoil and is air cooled.

It is fed by a drum magazine of 32 cartridges, which is the same as that in use for the Mod. 1908 long pistol. This drum is attached to

the left side of the arm at the height of the ejection hole in the right side.

The barrel is 20 cm. long and is protected by a casing, in which a number of round holes are pierced, in order to permit the free circulation of the air.

The sight is graduated for fire at 100 to 200 m.

The arm properly so called is mounted on hinges on a wooden stock provided with a butt, with shoulder strap, an arrangement which in its ensemble recalls that of the ordinary hunting rifles.

BOUNCING GRENADE.

Source: French Report on Enemy Munitions.

1 March 1919.

A device found on the French front, is a projectile with fins, which by its exterior form recalls the 15 Wurfgranate which the French troops call "Tourterelle" (Turtle Dove) and which has been described in a previous report.

Like this latter, the new grenade is thrown by Granatenwerfer 16, or by makeshift grenade throwers. But it differs from it in one important characteristic. Its upper part is capped with a sort of small steel mortar which contains a charge of black powder, and which, ignited by the operation of the percussion cap, throws the grenade above the ground; this bursts only after rebounding, thus increasing its killing powers.

Here is found a new example of the efforts already noted on the part of the enemy to cause those devices intended to throw fragments on personnel to ricochet or rebound.

Ricochet firing of guns commenced toward the end of 1915.

The case shot mine has the same object.

DESCRIPTION.

The grenade proper comprises:

1st. A cast-iron body with fragmentation lines on inside. It contains the burst charge. On the upper part is a tapped fuse hole intended to hold the fuse; vents are pierced in the middle part of the tapping. At the bottom of this fuse hole is a flattened surface on which the gaine of detonator rests by means of a flange.

The lower part of the body also has a tapped hole where the tail of the projectile is screwed on.

2d. A tubular steel tail, slightly conical on the outside and having on the inside a cylindrical cavity intended to cap the projection shaft of the grenade thrower. The lower part is open and the upper part is closed.

3d. Four sheet iron fins fitted on to tail.

The bouncing apparatus consists of a sort of small steel mortar, which caps the upper part of the body of the grenade and is adjusted on a cylindrical part of this latter. It is held in place by the fuse. There is a chamber between the base of this mortar and the top of the body of the grenade; a charge of black powder is introduced into this chamber through an opening closed by a screw.

The bore of the mortar is lined nearly all the way with a pasteboard ring.

The whole of the grenade and mortar is covered with a stamped out sheet iron jacket, which aids in guiding the grenade when it is thrown from mortar.

Over the whole can be placed a loose washer in the shape of a hood, whose edges appear to act as a spade to prevent the grenade from sinking too deep in muddy ground.

The fuse is a percussion fuse. It is distinguished by its ignition relay system which has several stages placed in the threaded tail.

1st. A mass of powder in the lower part of firing pin.

2d. A disk of compressed powder placed under the preceding powder mass and in contact with it.

3d. A mass of powder separated from the preceding and placed in the lower cone of plug, which is pierced with a central biconic cavity whose upper cone is empty. The surface of plug serves as a support for washer.

On the threaded tail of the fuse opposite the washer are two large vents perpendicular to the axis; thus the tail is almost completely cut into two parts, there being only two metallic connections from 4 to 5 mm. which connect the two parts.

When the fuse is set in place the shoulder between the head and tail block the mortar; the vents just spoken of are placed opposite those made in the fuse hole of the body of the grenade; both are closed up with wax.

The propelling charge differs noticeably in its arrangement from that of the "Tourterelle."

It is placed in a brass cup whose base has a primer. This cup is closed at the upper end by a brass disk surmounted by a steel washer; both are set by crimping the edge of the cup.

At the center of the steel washer are detached, by cutting, two tongues used for clamping on a star made of spring steel, whose points, slightly surpassing the circumference, are bent back toward the base. This system allows the primer seat to sink into the tail of the projectile, but it opposes any return movement. (It was necessary to saw off this tail in order to take out the primer seat.) This system is described as entirely analogous to the sliding tops of perfumery bottles.

OPERATION.

The mechanism of projection by grenade throwers is known.

On impact with the ground the percussion system of the fuse sets fire to the relay. The flame is transmitted on the one hand to the rebounding charge by the double system of vents and on the other to the washer.

The bouncing charge throws the grenade into the air from mortar; the tail of the fuse then separates in sections and the grenade drags the lower part, whose relay has been previously lighted by washer. When this relay burns up, the detonator operates and the projectile ought then to have reached the right height to produce the maximum effect.

MISCELLANEOUS.

REPORT ON WORK OF STOCKHOLM OFFICE NAVAL ATTACHÉ.

Source: Reliable.

19 April 1919.

(106700.)

EDUCATIONAL WORK.

The first and also the most constructive work accomplished by this office during the war was the educational work inaugurated and completed. On arriving in Christiania the latter part of November, 1917, as civilian assistant to the naval attaché for Scandinavia, I was ordered to Stockholm to make a survey of the propaganda problem in order that measures might be taken to counteract the very powerful German influence in Sweden. The Department of Information at that time and for fully six months after had no representative in Sweden. I found public opinion strongly pro-German and antagonistic to all the countries opposing Germany; also that, while both the British and French were weakly attempting some propaganda work, practically nothing was being done in a constructive way to counteract the work of the German organization, the effect of which was evident everywhere.

After a brief study of conditions, I found—

That the moving-picture theaters throughout Sweden and also throughout Scandinavia, while presenting a medium for the shaping of public opinion, being so universally patronized, were, however, gradually coming under German control, for the reason there was an embargo on American films to Scandinavia. I also found that German and Austrian propaganda films were being shown generally in the theaters, as they were in most cases furnished free of charge.

That all American and allied news coming to Sweden was controlled and distributed by the Svenska Telegram Bureau, which had been established by the German Wolff Bureau many years before, but which was now owned and operated by a pro-German Swede. I found on further study that this bureau was under the influence of the Wolff Bureau in Berlin and of the German Legation in Stockholm and was run solely in German interest, allied news being distributed to the press of Sweden as it best suited the interests of Germany.

That the greater part of the press of Sweden was pro-German, part of it bitterly so, and that which was not pro-German was, with few exceptions, attempting to assume a neutral attitude or was mildly Ententophile.

After reporting on the conditions found here, I set about to solve the problems presented, and, if possible, to get into our own hands the weapons being used by Germany to influence public opinion in Sweden.

It was soon found that moving pictures made in America were better in every respect and more popular with the Scandinavian public than German-made films. We were able by allowing films to come into the country under our control to force the moving-picture interests of Sweden and of the other two Scandinavian countries which desired to show our films to execute agreements which did not allow them to show German-made films in any theaters where American and allied films were shown, and which compelled the purchase and the showing in every afternoon and evening program of our propaganda and educational films. As a result, all German films were excluded from between 95 to 98 per cent of the theaters of Scandinavia, and American and allied films shown in their stead, which included, as already stated, in every afternoon and evening performance propaganda and educational films. The results of this work have not ended with the war.

With the assistance of Liberal and Socialist leaders in the present Swedish Government and of certain strong financial groups whose interests lay with the Entente powers, a new bureau was formed to take over from the pro-German bureau the distribution to the press of Sweden of all allied and other world news. The new bureau was formed with a capital of 1,500,000 kroner, an amount three times that of the pro-German bureau. Thus we finally, after many months' work, in the face of hostile public opinion and of an organized press campaign against the scheme, took from the hands of the German-controlled bureau the distribution of our own news. The result was that the tables were turned, that all American and Allied news reached the press, and that a certain kind of Central Power and Russian news, which had hitherto been suppressed because it was not in the interests of the Central Powers to have it published, was also given to the press of Sweden.

The problem of securing an influence in the Swedish press was partly solved through securing the assistance of the same group which had financed the news bureau. The sum invested in the press of Stockholm in Entente interest amounted to fully 5,000,000 kroner. Much work was also done and results accomplished throughout the entire Swedish press.

It will be seen, therefore, that the early work of this office was almost entirely devoted to educational work. It should be remembered, however, that this work also involved considerable intelligence work in securing information on the activities of the German legation in Stockholm, German agents, and Swedes of pro-German sentiments in promoting the above-mentioned agencies for influencing public opinion in Sweden, and especially in controlling here the distribution of all Allied news. To successfully consummate the work of establishing the news bureau it was necessary for me to go to London and to Paris the latter part of February, 1918, where I was finally able to induce the Reuter and Havas Agencies to transfer their news services from the German-controlled bureau in Sweden to the group working in Allied interest. I did not return to Sweden until the latter part of April, and it was not until the early part of May that this office was able to take up other intelligence work. In the development of our educational work close association had been formed with the leaders in the Swedish Government, and their assistance in our work here in securing information has been invaluable.

INTELLIGENCE WORK.

The principal intelligence work of this office has been the securing of all possible information—naval, military, political, and economic—concerning: (*a*) The Central Powers, especially of Germany; (*b*) Russian; (*c*) Finland and the Baltic Provinces; (*d*) Sweden.

In securing all possible information from the countries mentioned above, this office pursued the following methods:

(*a*) Concerning the Central Powers and especially Germany, advantage was taken of visits made by Swedish business men and officers of the army and navy to Germany; also of the visits made by Germans to Sweden; of Swedish and German sailors from boats trading with Germany; of German deserters, etc. The movements of German war vessels through the Sound and Cattegat were secured through a system of watching established along the western coast of Sweden. Considerable information on Germany was also secured from Swedish Government officials with whom this office had formed close relationship, and from people in touch with officials of the German Legation and consulate in Stockholm.

(*b*) and (*c*) Information on Russia, Finland, and the Baltic Provinces was secured from allied and neutral representatives and others coming out of these countries, as well as from agents sent to those countries. Considerable information relating to these countries was also secured through Swedish Government officials.

(*d*) Information relating to Sweden was largely secured from official sources, and from Swedes associated with business institutions, etc.

Other phases of our intelligence work were concerned with:

(*a*) Enemy propaganda in Sweden.

(*b*) Contraespionage.

(*c*) Investigation of firms trading with the enemy.

(*d*) Passport work.

(*e*) Investigation of crews on vessels trading with America.

(*f*) Investigation of shipments from Sweden of iron ore, wood pulp, etc., allowed with the enemy under agreement executed between Sweden and enemy countries with the knowledge and consent of the Associated Governments.

Other work, such as investigation of the cable communications with Scandinavia, of wireless stations, etc., was undertaken. Since the signing of the armistice this office has worked on tonnage matters, also matters relating to shipbuilding, commercial matters, especially those relating to the promotion of American trade, the Bolshevik problem, and on conditions in Russia, Finland, and the Baltic Provinces. This office also has now certain work relating to shipping in the Baltic—especially with regards to ships carrying food from America to Baltic ports—and is cooperating with the American food relief mission to Finland and the Baltic States.

In developing the work of this office the office of the consul general in Stockholm and the offices of the consulates in Gothenburg and Malmo have been of great assistance. In developing our system of coast watching for the detection of movements of enemy vessels the consulate at Malmo was of especial assistance, and the consulate at Gothenburg cooperated with this office in matters relating to seamen, shipping, and general intelligence matters. The office of the consulate general in Stockholm has been of the greatest value in assisting this office in many phases of its work. The legation has also cooperated, and this office has also cooperated and been of considerable assistance to the legation and consulates in Sweden.

In addition to the agents employed exclusively by this office, agents have been employed jointly from time to time with the office of the United States military attaché and with the British and French military and naval attachés. This office established in Finland, together with the British, an organization to secure Russian information—especially to get information across the Finnish border from Moscow and Petrograd from an organization already established in Russia by officials connected with our embassy and consulate there during 1917 and 1918. Later, on account of lack of funds, this organization in Finland was taken over by the British, but through an arrangement effected we still have the benefit of the information secured.

In the event of a future war with the Central Powers or with Russia, the Stockholm office should be developed into one of the

most important offices for Naval Intelligence work in Europe and should be under the charge of a competent and able intelligence officer, who should be given all the assistance needed. This assistance should include officers for intelligence and coding work, necessary clerical assistance, and sufficient funds with which to carry on the work. In the event of a future war in any other part of Europe, this office would be of value and should be under the charge of an able intelligence officer, as Stockholm is a center of information. It is the first stopping place on the direct road out of Russia, is closest to Finland and the Baltic Provinces, and is a center for Germans, Austrians, Roumanians, Poles, and, in fact, of all other nationalities of Central and Eastern Europe. For the present, and as long as Russia is unsettled, this office should be continued as a detached office under the supervision of the naval attaché for Scandinavia, but should be under the direct charge of a competent intelligence officer with a knowledge of the Scandinavian and Russian languages, if possible, and also of French and German. This office should include Finland in its territory, especially on account of the Russian information to be secured there; and I would suggest that Esthonia and the other Baltic Provinces also be included. When order is established in Russia the office of the naval attaché in Petrograd could take care of Finland and the Baltic Provinces, and this territory could then be taken care of by the naval attaché for Scandinavia.

Until I was ordered here there had never been a Naval Intelligence officer attached to this legation. The work of this office has therefore been developed during the past 16 months. There has for many years been a military attaché at this legation, and when this office was opened the office of the military attaché was fully equipped and had built up an organization for intelligence work. The work of the military attaché's office, however, was principally concerned with passport control work. As this work had been developed to a considerable extent and a large amount of information collected by that office which had to do with passport control work, this office did not think it wise to duplicate such work, but delivered all such information to the military attaché's office, and thus what was in fact a joint information office in all matters relating to passport work was established. This was the method followed also, I believe, by our naval attachés in Norway and Denmark.

The only special situation which this office was compelled to meet, outside of the necessity for building up organizations for coast watching for the detection of the movements of enemy vessels, mining operations, etc., and for securing information out of Russia, etc., which would seem worthy of special reference was concerned with the educational work already referred to in the first paragraphs of

this letter. After reporting on conditions then existing in Sweden, following the survey made of the propaganda problem here, as there was no possibility of bettering the conditions found and of controlling the German influence unless some organization or some agency took the initiative, there being no such organization or agency prepared at the time to take such action, this office took the initiative itself and set about to solve the problems as presented. As a result a most important piece of constructive work was accomplished. It would seem, therefore, that in certain emergencies reporting on conditions found is not only the duty of an attaché, but also the seeing to it that the conditions, if harmful to his country's interests, are changed, even if by so doing he finds it necessary to depart from what might be strictly considered his ordinary prescribed work.

JAPANESE NAVAL CONSTRUCTION.

Source: Reliable.

2 May 1919.

(7206 B.)

PROJECTED CONSTRUCTION.

The teachings of the war have not caused Japan to decide to modify her conceptions in the matter of naval construction. She pursues the realization of a program established well before the war and which comprises:

8 large battleships.
8 battle cruisers.
A certain number of light cruisers.
54 destroyers.
48 submarines.

Information concerning the characteristics of the new ships is scarce; however, the arrangements of the ships under construction have certainly undergone changes since a special allotment of 128,000,000 (francs)—$21,000,000—was put down for changes in plans in the estimates for 1918–19; furthermore, certain ships have been delayed in their laying down, which can be attributed in part to the incertitude existing concerning the characteristics to be given them. The delays in laying down that occurred in 1916 coincide with the information furnished by the Battle of Jutland and permit of presuming that amongst the changes must figure the increase in range of the heavy guns, the caliber of which, after long hesitation, was raised to a maximum.

A rumor circulated that the new ships had boilers constructed for oil firing exclusively. It was officially declared that this was not the case. All the ships under construction will have both methods

of firing as has been the rule for several years past in the Japanese Navy. It is only in the case of the projected torpedo boats that exclusively oil firing is considered.

It is to be remarked that Japan was not particularly preoccupied in the combat against submarines, and that while she is providing vessels of the classic type with new devices to destroy them, she is not constructing any of the vessels used by western powers in this special warfare (sloops, gunboats, vedettes, etc.).

Battleships.—Proposed battleship: *Kaga-Tosa* (no information); orders for laying down are said to have been given in April.

Battleship under construction, 34,000 tons: *Nagato-Mitsu;* eight 16-inch, twenty 6-inch guns; 23 knots.

Latest battleships commissioned, 30,600 tons: *Yamashiro*, *Fuso:* Twelve 14-inch, sixteen 6-inch guns, and twelve 12-pounders; *Ise*, *Hyuga:* twelve 14-inch, twenty 5.5-inch guns, and four 12-pounders; six 21-inch torpedo tubes.

The heavy guns are distributed in six double turrets on the center line; Parsons or Curtis turbines.

Battle cruisers.—Proposed: *Kitamaya*, *Kiso*, *Oi* (no information).

Light cruisers.—Two types: One of 6,000 to 8,000 tons. *Tama* (?), intended to serve as squadron leader; the other of 3,500 tons, of *Tatsuta* type, four 5.5-inch guns; 33 knots. It is said that during trials the *Tatsuta* made the 33 knots as planned.

Destroyers.—Vessels of 1,200 tons, approximately (first-class torpedo boats), of which two already existed in 1914. The characteristics of the latest are said to be: 1,230 tons, 33 knots, four 4.7-inch guns, three double 18-inch torpedo tubes; 3 engines, Parsons or Curtis turbines, 5 boilers (3 for oil, 2 for oil or coal). According to other information they are said to be: 1,250 tons, 35 knots, two 6-inch, four 4-inch guns, three double-torpedo tubes, a protected deck against bombs. These latter characteristics appear incompatible.

The characteristics of the next class (second-class torpedo boats) are: 850 tons, 32 knots, three 4.7-inch guns, two machine guns, two triple-torpedo tubes, two engines, four boilers (two for oil, two for oil or coal).

Submarines.—*Nos. 18* and *21* are of the Italian type; *Nos. 19* and *20* are of the French type. Japan having obtained a few German submarines, which were taken to her navy yards, it is beyond all doubt that the next vessels will be largely planned according to German conceptions.

To summarize: Extremely fast ships; disappearance of intermediary tonnage for protected cruisers; on the large ships, large-caliber guns with an extensive arc of train; scout vessels, the tonnage of

which will be sufficient for deep-sea navigation, but the loss of which can be borne without any great disadvantage.

Ships commissioned since 1914:

Battleships of 30,000 tons: *Yamashiro*, *Ise*, *Hyuga*, *Fuso*.
4 destroyers of 1,200 tons.
10 destroyers of 840 tons.
10 destroyers of 660 tons.
4 or 5 submarines of 700 tons.

NAVAL PROGRAM.

New construction (in millions of dollars):

Amount of estimates for 1916–17 (new construction, 146.6; repairs, 32)	178.7
New appropriations in 1917	130.7
	309.4
Appropriations for repairs in 1918–19 canceled	1.7
Balance	307.7
New appropriations in 1918 (estimates for 1918–19)	150.2
Total	457.9
Expended to 1917, inclusive	165.9
Balance to be expended from 1918 on	292.0

This amount has been distributed in the following manner:

	Million dollars.
1918–19	37.5
1919	50.1
1920	52.7
1921	61.7
1922	60.6
1923–24	29.4
Total	292.0

The 150.3 million dollars appropriations are divided as follows:

Construction of new ships (not provided for in the preceding program)	124.4
Additional expenditures caused by changes in plans of ships	21.4
Additional expenditures caused by increased cost of materials	4.5
	150.3

It is proposed to carry out the following work up to 1923 inclusive:

(*a*) Continuation of work on the *Nagato* and *Mutsu*, and laying down of 2 battleships of larger type (probably 35,000–40,000 tons, according to certain information), thus bringing up to 8 the number of superdreadnaughts.

(*b*) Laying down of 4 battle cruisers, 2 of which were planned since the beginning of 1917, intended to replace the *Kongo* and *Hiyei*, and 2 (constructed with the new additional appropriations) intended to bring the number of these ships up to 6, in reality 8, if it be considered that the *Kongo* and *Hiyei* will not be completely obsolete in 1923.

There would therefore be 6 battle cruisers to be laid down, 2 having been planned for 1918; there would remain 4 for 1919 to 1921, inclusive.

(*c*) Continuation of the light cruisers *Tatsuta*, *Tenryu*, *Kuma*, *Tama*, and laying down of 8 new ships of this kind.

(*d*) Continuation of flotilla vessels and laying down of new ones, concerning the number of which no precise information is available; but the object proposed appears to be to constitute a first-line flotilla (vessels of less than 10 years), comprising 54 first and second class torpedo boats and 48 submarines.

An analysis of the appropriations to be expended up to 1923 appears to show that they permit the construction of the 8 battle cruisers above mentioned, 12 light cruisers (*Tatsuta*, etc., included), 20 first-class destroyers, 30 second class, and 36 submarines.

According to press information the following ships were to be laid down in 1918:

Two battleships or battle cruisers to be constructed at Kure and Kobe (Kawasaki).

Three protected cruisers: *Kitayama*, *Kiso*, *Oi*, respectively at Sasebo, Nagasaki, and Kobe.

Five first-class destroyers: *Okikaze*, *Shimakaze*, and *Nadakaze* at Maidzuru; *Hakaze* or *Hayakaze* and *Yakaze* at Nagasaki (Mitsubishi).

Eight second-class destroyers (improved *Momo* type): *Momi*, and . . . at Yokosuka; *Kuri* and *Nire* at Kure; *Nashi* and *Taki* at Kobe; *Kaki* at Uraga; *Tsuga* at Tokyo (Ishikawajima).

Several submarines at Kure, Kobe, and Nagasaki.

Owing to the shortness of labor and skilled labor it is to be expected that the large ships will suffer delay, as have the *Nagato* and *Mutsu*. A large part of the new appropriations will without doubt be applied to light ships.

COMPARISON OF TONNAGE OF UNITED STATES AND JAPANESE WARSHIPS. (Figures Complete Beginning of 1919.)

Source: Reliable. **24 May 1919.**

	United States.	Japan.
Superdreadnoughts	293,800	123,720
Dreadnoughts	83,650	20,800
Predreadnoughts	340,146	167,746
Battle cruisers		110,000
Armored cruisers	111,900	124,733
Cruisers [1]	109,650	61,279
Gunboats	5,824	34,410
Ocean destroyers	94,583	19,371
Coast destroyers	6,275	16,346
Torpedo boats	3,146	3,317
Submarines [2]	29,886	3,418
Ironclads, monitors, and armored coast-defense vessels	24,964	12,803

[1] Includes cruisers, first, second, and third class.
[2] Does not include submarines turned over by Germany.

MARCONI WIRELESS LOAN TO CHINESE GOVERNMENT.

Source: Reliable.

19 May 1919.

The Peking Leader, March 26, 1919, gives the text of the Marconi wireless loan to the Chinese Government. The agreement is for the erection of wireless equipment, the purpose of which is to make communication between Kasgar and Sianfu more complete.

The amount of the loan is £200,000. This amount is divided, £66,000 being for equipment and £134,000 being to cover the cost of transportation and erection. The interest on the loan is fixed at 8 per cent.

The company is to supply the Chinese Government with three wireless stations of the latest type, and the guaranteed daylight range is 700 miles. Detailed specifications are made for the equipment of each station.

VISIT OF THE "JOFFRE" MISSION TO THE UNITED STATES AND ITS RESULT—THE FIRST CONVOY.

Source: Reliable.

May 1919.

(11637.)

ORIGIN OF VISIT OF MISSION.

At a dinner party on or about the 20th of April, 1917, there was gathered together to discuss the general situation, a very discouraged and depressed company of American and French gentlemen. The general offensive of the 16th of April had failed, and failed disastrously. The offensive by the German intelligence department, the real method by which they still hoped to win the war, was in full swing, gaining more momentum and more success day by day. Russia was on the point of going over body and soul to the enemy; the German general staff was already counting on the number of troops it would have from the Ukraine for the spring campaign of 1918. The French Army was rapidly becoming demoralized, and the defeat of the 16th of April was just what was needed to set off the train of sedition, treason, and mutiny, which the intelligence sections of the German Government had been preparing so carefully and for so many years. The soldiers were commencing to believe they had been betrayed by the Government, that the enemy had been given plans for this offensive. In justice to M. Malvy, the minister of the interior at the time, it is only fair to state that on this particular charge he was subsequently acquitted. But the seeds for disaffection, which two months later were responsible for so many military executions, were already sprouting.

It did not seem possible to make the French people believe in receiving any military support from the United States. A large number of Frenchmen thought what had been assiduously spread about by the German propagandists that we had come into the war merely to bring it to an end by a compromised peace.

As we were all discussing this, our host turned to the Frenchmen and said, in effect: "Why don't you send Joffre over; he is the only Frenchman they know or will listen to in America. If they only understood, they would act." One of the men to whom this was addressed, a leading member of the French propaganda committee, immediately left the table. He returned shortly afterwards and bade us good night, explaining that he had called up M. Painlevé on the telephone and that he was going to have an interview with him immediately.

This, I believe, was the beginning of the Joffre mission to the United States, which eventuated finally in the "First convoy."

THE FIRST CONVOY.

If one realizes that at that time the security in France against enemy agents was in the hands of M. Malvy, minister of the interior, since tried and banished for criminal neglect of duty, and that the then head of the secret police and the chief assistant to the prefect of police are both now serving jail sentences for intercourse with the enemy, the necessity for guarding military secrets is self-evident. However, we did the best we could, and I am quite sure from subsequent events that we fooled the Germans as to which port our convoy was to make.

I proceeded to Brest in order to meet the convoy, and after getting the latest information from Paris in regard to mine fields and the news of the place and time of the projected rendezvous I boarded the *L'Oise*, and with another sloop of the same class we immediately put to sea on our mission. This was the afternoon of the 24th of June.

These sloops belonged to a series of 40 constructed by the English, of which 8 had been sold to the French. They were built especially for antisubmarine work and were so constructed as to be able to receive more than one torpedo and still remain afloat. Their reputed speed was 17 knots, but *L'Oise* could not make 15, and I doubt if her consort could do 13 at this time. At this time the morale of the whole French nation was such that I believe a delay of two months more in our sending troops, thus giving them some visual demonstration that we were really in the war, would have resulted in France capitulating.

No one who goes over the official documents already published, and who knows something of the temper of the French people and was acquainted with the strangle hold the German intelligence departments were getting on the country, could think otherwise.

Contact was to have been made with the "First convoy" at daybreak on the 26th. Whether it was the navigating or whether since our leaving Brest the exact point of rendezvous had again been changed I do not know, but there was no sign of the convoy. The captain of *L'Oise* was at first for giving it up, but I persuaded him to scout a bit with both his ships, as there was a possibility that the convoy had slipped by us during the night. So the two sloops separated to a distance of 10 miles and scouting operations commenced. It was about 11 a. m., if my memory serves me correctly, when we first sighted the convoy and proceeded to make contact. This, the first division of the convoy, was under the immediate command of the force commander, Rear Admiral Albert Gleaves, United States Navy. We reported to him and then proceeded to attempt to pilot the flagship into Croisic Bay for the night, but our speed was sadly inadequate, and, after we had given the latest information in regard to mine fields, the flag went on ahead, we arriving there about one hour afterwards.

I immediately went on board the *Seattle*, the flagship, reported to the admiral, and turned over the embarkation plans to the staff. It was then 2 a. m. of the morning of the 27th.

At daybreak the whole squadron got underway, and before noon all were moored to the quays or anchored off St. Nazaire. The bluff of the German Admiralty that not one American soldier should step foot in France had been called, and it could not have been called at a more psychological moment.

EFFECT OF FIRST CONVOY.

Now that it is all over and we have won, and so many big historical events have happened since, we are prone to forget the importance and what was at stake on a successful outcome of this expedition. If even one transport had been sunk it might have resulted in disaster to the allied cause. In looking at things from their proper perspective, to appreciate the value and importance of this achievement, it should be taken into consideration that less than a month before German regiments had actually been marching on Paris, that during this month there were 300 executions in the French Army for sedition and mutiny.

On account of the necessity of preserving as much secrecy as possible in regard to which port in France the expedition was destined, it was not deemed wise to make any extensive preparations to prepare for the quick debarkation of the troops and discharge of the ships.

Our precautions were well justified. Capt. Baker and Col. Stanley, Quartermaster's Corps, United States Army, with the copy of the plans, arrived at St. Nazaire the morning of the 26th. They secreted the plans of embarkation between the mattresses of a bed in their

room in a hotel, only to return an hour and half later to find them gone.

So, naturally the discharge of troops and getting the ships ready for the return voyage took more time than would have been normally the case if we had been able to trust all the inhabitants of the country in which we were landing. At that time there were 40,000 aliens in that Department of France alone, under practically no contra espionage control whatsoever.

As soon as my work had been completed in St. Nazaire before leaving I broached the subject to the admiral of his visiting Paris for the 4th of July celebration we had planned as part of our propaganda campaign. To this he readily assented, and accordingly on the morning of the 4th he arrived in Paris accompanied by his personal staff.

The day started for us with a ceremony at the "Invalides," where the Army, through Gen. Pershing, was presented with a stand of colors by a French patriotic society, in the presence of the President of the Republic. From there we went through cheering crowds to Picpus Cemetery, where lies the grave of Lafayette. Addresses were made by Col. Stanton, Gen. Pershing, and the minister to Belgium, Brand Whitlock.

Luncheon at the American Chamber of Commerce was followed by official calls and a reception at the embassy, and then dining with Gen. Foch, at that time chief of the general staff, finished what might be called a fairly busy day.

It is a long way to say that if the first convoy had met with disaster it would have entailed disaster to the whole Allied cause. But the facts remain that until the convoy had safely landed American troops in France nothing was done by the French statesmen to avert the condition of anarchy and demoralization into which France had been falling since 1915 under the skillful guidance of the German intelligence bureaus.

The admiral had scarcely left Paris when the first move was made by appointing an investigating committee composed of members of the war committee of the Senate, and on July 22, 1917, Clemenceau made his famous speech, which a few months later swept him into power and once and for all broke the grip which Germany had on French politics.

LETTER OF GEN. PETAIN.

On May 27, 1917, a month before the first convoy arrived, the then commander in chief, Gen. Petain, addressed the following letter to the Government, from which extracts are quoted:

In a general fashion these manifestations do not seem to be directed against the military command, but against the Government.

What are the causes of this dangerous ferment?

1st. The tracts which are distributed in the railroad station of Paris (see the report of May 15 on the pacifist propaganda).

2d. The instigating agents who slip into the cantonments in a different uniform from that of the corps. They have been noticed particularly in the —— Corps.

3d. The influence of the Russian brigade.

4th. The articles in the press (upon the Soldiers' Committee in Russia, upon the cessation of action of the troops).

5th. The hope of immunity or at least commutation of the penalties incurred following the progressive restrictions which have been imposed on the section of courts-martial.

6th. The increase of drunkenness in the army, increased by the opposition which the command has met in trying to oppose the bringing of wines into the war zone, and of the considerable sums the men have to spend on coming out of the trenches (indemnity for trench services, commutation into money of part of the ration).

7th. The attitude of mobilized workmen, of certain officers, and soldiers at the pacifist meetings in the interior. This attitude, which seems to remain unpunished, is noticed at the front.

8. Upon the popular movements which are happening at the present time in Paris. The movement is also deep-rooted in the interior. For, in accordance with the regulations regarding leave, which can not be changed, the front is in touch with the rest of France. The situation at any instant is liable to become very grave, and I can not insist too much that some energetic measures be taken with a view to remedying it.

The most urgent would be, according to my views, the following:

1. Place where it will be impossible for them to do harm the authors of the tracts which are sold about the railroad stations in Paris. These individuals are perfectly known.

2. Take energetic measures against the officers, soldiers, and mobilized workmen who frequent the pacifist meetings in the interior, and above all send them back to the front.

3. Control and watch strictly the press.

4. Establish immediately the act of repression by suspending the effects of the law of April 27, 1917, and the circular of April 20, 1917. I will undertake on my side the necessary measures to arrest in the cantonments the instigating agents and to reduce as much as possible the increase in drunkenness.

The presence of Admiral Gleaves in Paris proved beyond doubt to the Parisian population that the transports had actually arrived in France, and though some of their statesmen took heart immediately and acted, still the "system" was so firmly entrenched that it was not until October following that it was thrown out of power.

This article is not intended to be an expose of the German propaganda in France, but merely to show what a tremendous moral influence the safe arrival of the first convoy had on the success of the Allied cause. And finally, to show the reader what the actual state of France was on June 27, 1917, the day of the landing.

JAPAN AND GERMAN SUBMARINE OFFICERS.

Source: Reliable.

Japan is selecting the most experienced German submarine officers for service in Japan, and paying high salaries for their services.

AMERICAN ENGINEERING CORPS—MURMANSK.

Source: Reliable.

The American consul at Murmansk reports that the presence of American engineering troops in that region is making a very favorable impression among local workingmen, from whom expressions of sympathy and interest are heard. The morale of the troops is excellent, and their work is being performed in an earnest, quiet, and unobtrusive manner. The consul believes that the United States may prove the principal factor in creating an improved political atmosphere at Murmansk.

Y. M. C. A. workers have informed Mr. Poole that Russian troops in the Archangel area anticipate the departure of the American Engineering Corps with forebodings of genuine dread and insist upon their hostility to the Bolsheviki.

THE FINANCIAL POSITION OF THE SIBERIAN GOVERNMENT COMPARED TO THAT OF THE SOVIET REPUBLIC IN 1918.

Source: Translations from "Russkaya Gisn" (Russian Life—Helsingfors).

8 April 1919.

[In 1,000 rubles.]

	Soviet Russia.	Siberian Government.
General expenses per month	2,200,000	567,000
Army expenses per month	1,150,000	348,000
Issue of paper money by Bolsheviks, unknown, probably	30,000,000	.....
Bonds	.....	728,000
Paper money	.....	5,000
General expenses July–Dec. 18	17,602,727	3,402,000
Of which for military purposes	13,619,977	2,088,000
The revenues were for the same six months	2,852,727	2,280,000
Deficit	14,750,000	1,122,000

The Bolsheviks spent for nationalization of industry two billions from July to December, 1918, and had a return of 200 millions. In Siberia industry has not been touched and the government receives large quantities of gold, platinum, and copper.

In 1916 the old régime spent 15,260,000,000 rubles for an army of 10,000,000, compared with 13,620,000,000 of the Bolsheviks for six months only and for perhaps 500,000 men.

Goukovsky, the Bolshevik commissary of finances, who published above figures, proposes new taxes on the whole population in order to cover at least part of this enormous deficit.

Now, continues the writer of this article, it becomes clear why the Bolsheviks are pressing the peasants so hard, but they meet a stubborn resistance, which is growing stronger of late and the deficit is growing, too. How long such anarchy can last the near future will show.

LOAN REQUESTED BY RUSSIAN POLITICAL CONFERENCE.

Source: Reliable.

15 May 1919.

The American embassy at Paris is in receipt of a note from the French foreign office inclosing a memorandum from the Conference Politique Russe de Paris, comprising among its members such men as Boris Bakhmeteff and Raffalovitch, presenting an appeal for financial aid from the allied and associated powers to the Russian anti-Bolshevik forces. The sum requested is about 700,000,000 francs. The foreign office stated that, before taking any action on the memorandum, it desired to ascertain the views of the American Government in the premises.

The matter has been referred to the American mission, where it is still under consideration. The mission has stated informally, however, that it appears doubtful whether, under existing laws, the United States Treasury could furnish such a sum to the Russian political conference.

ERRATA.

Errata in Bulletin No. 5, 15 May 1919, under "Summary of activities of United States naval forces operating in European waters":

Page 17, substitute "Lieut. Commander W. H. Lee, U. S. Navy," for "Lieut. Commander H. D. Cook, U. S. Navy."

Page 18, substitute "Lieut. Commander M. B. McComb, U. S. Navy," for "Lieut. Commander M. B. McCord, U. S. Navy."

○

APPENDIX.

MONTHLY INFORMATION BULLETIN, NUMBER 6, 1919.

DIGEST OF REPORTS RECEIVED BY OFFICE OF NAVAL INTELLIGENCE, MAY 5 TO JUNE 2, 1919.

AVIATION.

Subject.	Date.	Pages.	Reference number.	Remarks.
Aircraft technical note 141	12 Apr., 1919	14	10212 E	Notes on Aeroplane Wing Covering.
German Naval Air Service	Dec., 1918	67	11656	A report on the German Naval Air Service, Seaplanes, and Airships.
Aviation	29 Apr., 1919	2	10212E	Aircraft technical note No. 147. Mildew on rope and envelope fabric of astra airship A. T. 13.

COMMERCE.

Commerce and trade of the Netherlands	30 Apr., 1919	9	11640	Extract from Daily Consular and Trade Reports issued by Department of Commerce and Labor.

COMMUNICATIONS.

Direction cable	8 Apr., 1919	3	11594	Method of following cables and locating breaks in them.
Project for regulating wave lengths and powers attributed to fixed stations.	17 Apr., 1919	17	11610	A translation from the French. H. De Bellescize, author.

INTERNATIONAL CONDITIONS.

Portugal		24	11646	A general report on conditions in Portugal.
Lettland	22 Apr., 1919	3	11200	A report on conditions in Lettland.
Finland	10 Apr., 1919	12	9799B	A short report on conditions in Finland, giving area, industrial conditions, etc.
National Expenditure—England	1918	317	10064B	Reports from the select committee on national expenditure, together with the proceedings of the committee and the minutes of evidence taken before the subcommittee in the form of public accounts.
Japan	9 May, 1919	10	11643c	Specialist schools of the Japanese Navy.
Great Britain	28 Feb., 1919	93	5618R	Defense of the Realm Regulations. Monthly edition.
The Finnish Navy	26 Apr., 1919	3	11596	A short report on the personnel and matériel of the Finnish Navy.
Russia	24 Apr., 1919	7	11702	The Haunerig concession. A study of the Bolshevik government and its real results.

INTERNATIONAL LAW.

Subject.	Date.	Pages.	Reference number.	Remarks.
Contraband (Italy)	3 Apr., 1919	2	5504	An administrative decree setting forth articles that are to be considered as absolute contraband.
The Chino-Japanese negotiations	15 Mar., 1919	9	11229	Documents concerning mutual agreements between China and Japan relative to joint action against the enemy (Russia); article appearing in the Peking Leader.
Japanese naval budget	10 Apr., 1919	3	11305	Estimates for the fiscal year 1919–20.
Economic situation—Holland	15 Apr., 1919	1	10579	A report from the Hague.
Treaty of peace with Germany	7 May, 1919	38	11507A	Semiofficial summary of the treaty of peace between the 27 Allied and Associated Powers and Germany.
Italy	1919	16	11093	A summary of the Italian National Revindications at the Congress of Peace, published by the Italian Home Defense Committee.

OPERATIONS.

Austrian dreadnaught *Szent Istrau*	28 Mar., 1919	3	5358D	A private letter of an officer of the Austro-Hungarian Navy giving particulars of the sinking of the *Szent Istrau*.
Japanese naval losses	1 Mar., 1919	3	11318	List showing losses of merchantmen by Japan during European war.
Turkish naval losses	10 May, 1919	2	5530	List showing losses of all ships by Turkey during European war.
H. M. Navy	1919	38	7957B	Appendix to the appropriation accounts for the years 1914–15, 1915–16, and 1916–17, showing these accounts in an amplified form, together with an explanatory note by the accounting officer.
Mine fields	9 May, 1919	4	11609	Mine warnings to mariners, showing positions of mine fields and routes in Mediterranean, France, Corsica, Sardinia, Italy.

ORDNANCE.

Torpedoes—Italy	28 Mar. 1919	1	4005	Torpedoes lost or expended by the Italian Navy during the war.
German munitions	1918		11050ccc 11050ddd 11050eee 11050ff	Examination of German munitions by French Army.
Examination of German munitions	1 Apr. 1919		11050p	Translation of previous articles on same subject mentioned in digests of previous bulletins.
French long-range gun	29 Apr. 1919	3	11652	This is a different gun from that referred to in reports prior to armistice.
German munitions report No. 30	1 Jan. 1919		11050GGG 11050HHH. 11050III.	Examination of German munitions captured by the French Army; reports written in French.
Orduance	Aug. 1918	15	11050I'	Examination of enemy material and ammunition.
15-inch gun	Dec. 1917	21		Analysis of three trajectories of the 15-inch gun.

SHIPPING.

Report on Spanish shipping	26 Mar. 1919	8	6614	A report which includes subvention laws, the Spanish policy of aid and merchant shipping. Total Spanish shipping in service at preservation, the main Spanish steamship lines, and their sailing routes.

MISCELLANEOUS.

Organization (British)	1919	20	11592	Final report of the committee appointed to inquire into the organization and staffing of government officers.
Draining of the Zuyder Zee	26 Mar. 1919	3	11573	Draining of the Zuyder Zee and transforming it into a fresh-water lake, to be used for irrigational purposes.
Translations from Russian newspapers	1 Apr. 1919	7	10965°	Showing conditions in Russia.
Iron ore deposits—China	26 Mar. 1919	4	11624	Report prepared by military attaché, 21 Mar., 1919.
The German iron industry	23 Apr. 1919	4	11014	A description of Germany's resources as regards production of pig iron.
British Army annual bill	1919		11628	A bill to provide, during 12 months for the discipline and regulation of the British Army.
Foreign press	14 Apr. 1919	70		Food, reconstruction and Allied press to the review of the Foreign press.
Problems of the peace	1919	360	11583	A book written by W. H. Dawson, author of "The Evolution of Modern Germany".
Finnish merchant fleet	14 Apr. 1919	4	11541	A résumé of the Finnish merchant fleet showing condition before war and at present time.
Petroleum in China	24 Apr. 1919		11670	State Department's report on "Petroleum in China" with reference to its political aspects.
Coal situation in Argentina	27 Apr. 1919		11669	Confidential State Department report on Argentina coal situation.
Petroleum fields in Venezuela	23 Apr. 1919		9355	Confidential diplomatic report on Venezuelan oil production.
Coal in Japan	19 Apr. 1919		130	Deals with the political aspects of the coal industry in Japan.
Coal situation in Brazil	28 Apr. 1919		11667	Deals with coal shortage in Brazil.
The *Sussex* affair		7	11682	Complete report on the sinking of S. S. *Sussex*, 24 Mar. 1916, when bound from Folkestone to Dieppe.
Jugoslavia	28 Feb. 1919	46	11689	A monograph on Jugoslavia.

CONFIDENTIAL

Number 7—1919

OFFICE OF NAVAL INTELLIGENCE

MONTHLY INFORMATION BULLETIN

15 JULY 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 July 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

MONTHLY INFORMATION BULLETIN.

NUMBER 7—1919.

15 JULY 1919.

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1919.

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OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 7—1919—15 July 1919.

FOR CONVENIENCE IN ROUTING.

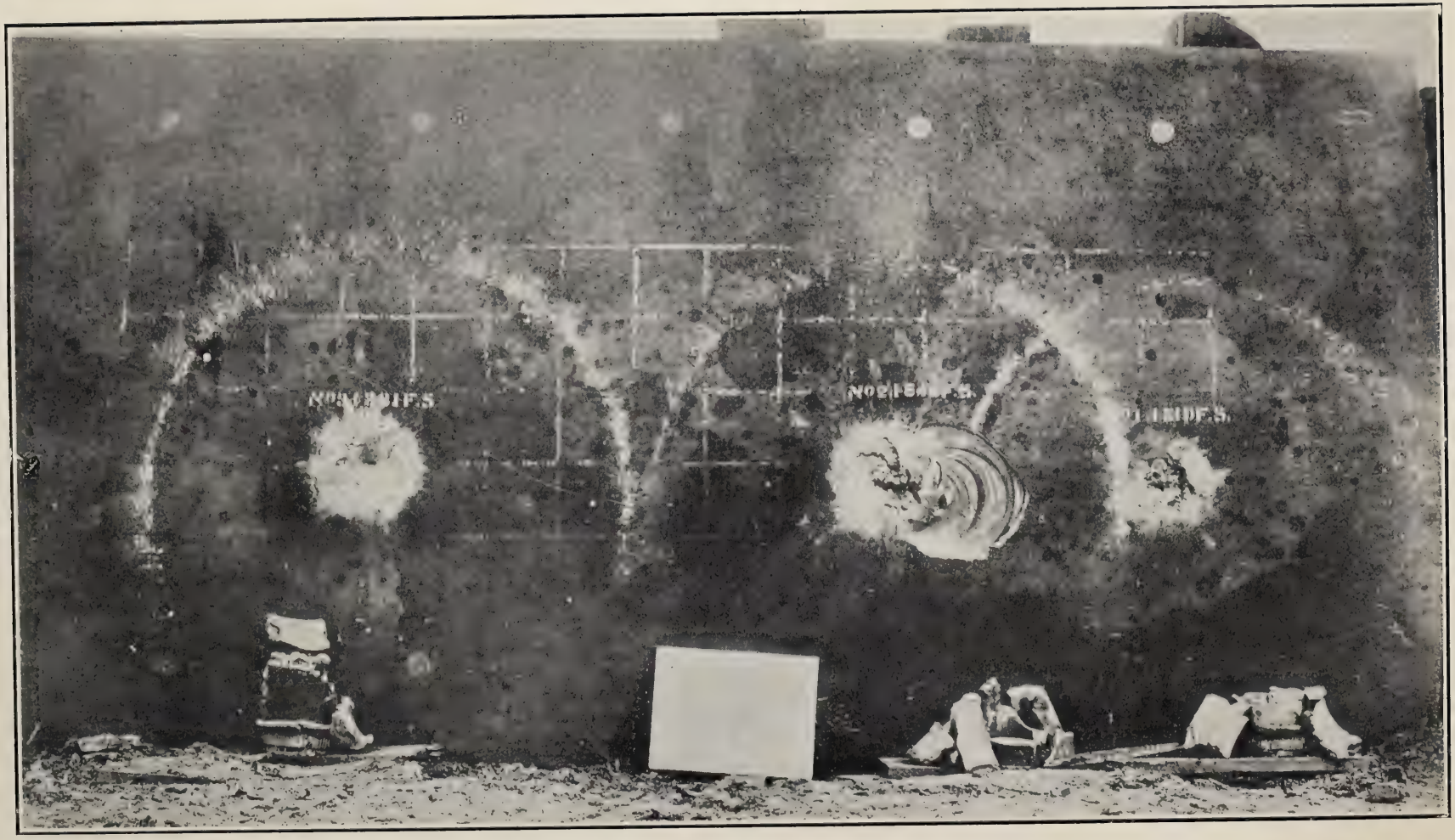
Officer.	Initials.	Date received.	Date forwarded.
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EXECUTIVE OFFICER			
FIRST LIEUTENANT			
NAVIGATING OFFICER			
GUNNERY OFFICER			
COMMUNICATION OFFICER			
ENGINEER OFFICER			
MEDICAL OFFICER			
SUPPLY OFFICER			
FIRST DIVISION OFFICER			
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13-INCH ARMOR PLATE AFTER BALLISTIC TEST.

AVIATION.

DEVELOPMENT OF FLEET AVIATION.

Source: Reliable.

10 March 1919.

(11729.)

The following extract of a report is published for information of the service, as it shows conclusively that the fleet with all possible aerial auxiliaries in a modern naval engagement will have an enormous advantage over a fleet not so equipped.

Ship planes could be used advantageously at sea carried by and operating from vessels of the types below enumerated and for the stated purposes:

Purpose.	*Type of ship.*
(*a*) Spotting	Light cruisers and capital ships.
(*b*) Scouting	Light cruisers and plane carriers.
(*c*) Fighting	Light cruisers.
(*d*) Firing torpedoes	Plane carriers.
(*e*) Bombing	Plane carriers.

SPOTTING.

Control of land batteries by airplanes and kite balloons was general during the war and was practically the only form of control for heavy artillery. Spotting for ships was done by planes with great success in the attack on the *Koenigsberg* in the African River by British ships using indirect fire. Also Squadron 202, attached to the British Naval Wing, spotted successfully for monitors firing on the Belgian coast. They used DH 4's with Rolls Royce Motors.

During the recent long-range spotting practice held off Guantanamo Bay the *Texas's* two-seater spotting and reconnaissance plane spotted two strings. During the third string a smoke screen was used rendering the target invisible to the spotting ship. This string was easily spotted from the airplane and spots were sent by radio telephone to the *Pennsylvania.* These were distinctly heard. The average error for the third string was only 64 yards. Spots can be sent perfectly by radio telephone or telegraph or by searchlight.

SCOUTING.

The value of planes for scouting has been many times demonstrated in the war, and the lack of such auxiliaries at Jutland was keenly felt by the British; so much so that after that battle they took immediate steps to save themselves from being caught in any future engagement without the valuable aid of airplane scouts. The value of having planes leave the fleet anywhere at sea, travel at a rate of 100 to 130 miles an hour, with a five-hour fuel supply, and capable of maintaining continuous radio communication up to 150 miles, can be readily seen. The Germans depended largely on Zeppelins and with great success at first; but, while dirigibles may very probably be used, the advent of the fast, quick-climbing fighting airplanes as a Fleet auxiliary has rendered dependence on Zeppelins hazardous.

Ship-plane scouts can travel so fast and see so far that, considering the present efficiency of aircraft radio, they have become almost indispensable. The British in the North Sea were finding their planes more useful in scouting, and had a major engagement taken place toward the end of the war scouting aircraft would undoubtedly have figured prominently.

FIGHTING.

It seems probable that the first phase of any future Naval Engagement will be an air battle; the side winning this will have a decided if not a deciding advantage in the fight. Every Fleet must, therefore, carry a large number of fighting planes. They will be capable of making from 120 to 160 miles an hour, and of from two to three hours' flight. They will be used to combat the enemy scouting, spotting, torpedo, and bombing planes and also the enemy dirigibles or Zeppelins. They can also be used to "strafe" enemy battleships with machine guns and small bombs, shooting everybody out of the tops, signal bridges, and torpedo-defense stations. One of the biggest and most successful raids of the war was carried out by a group of about 60 single-seater Camels, each carrying two Vickers guns and four 25-pound Cooper bombs. This was against the Varsennaer Aerodome in Belgium and practically put one of the most important German Air Stations out of commission. The raid was carried out from a very low altitude. That a large number of small planes flying low can successfully attack positions defended by antiaircraft guns, rifles, and machine guns had been repeatedly demonstrated, often on a large scale, as in the St. Mihiel fight.

Destroyers are so easily damaged and submarines are so slow and vulnerable that it seems that, as torpedo carriers, ship planes may be

the future weapon. They can be used night or day. A ship of the *Furious* or *Argus* type with 12 to 15 torpedo planes should be a match for a whole Battleship Division.

BOMBING.

Plane carriers can carry a number of DH 4's for bombing. These planes make 130 miles an hour, carry two 230-pound bombs for use against ships or as depth bombs. They carry two men and from two to four machine guns and protect themselves. A large squadron of these planes operating with the fleet would be a decided menace to a formation of battleships or to submarines.

AVIATION IN BRITISH FLEET.

Source: Reliable.

POLICY.

This policy may be stated in general terms to consist of the following provisions:

(*a*) There shall be provided for the service of the fleet adequate heavier than air machines for the following services:

(1) Reconnaissance.
(2) Spotting.
(3) Fighting enemy planes (spotting, reconnaissance, or torpedo planes).
(4) Torpedo planes.

(*b*) There shall be provided sufficient aerodromes to—

(1) Maintain the allotment of planes, by replacement, repair, or overhaul.
(2) Train sufficient personnel for fleet service.
(3) Conduct such experiments as may be required in the development of air operations in connection with the fleet.

(*c*) There shall be provided such carriers as may be required to carry the planes which the development of operations indicates to be necessary for the efficiency of the air service of the fleet.

(*d*) All dreadnaught battleships and all battle cruisers shall be fitted for carrying planes off from turrets. At least two ships of each light cruiser squadron shall be fitted to carry one plane capable of flying off from a short runway constructed on the forecastle.

AIRPLANE OPERATIONS.

Reconnaissance.

The weather conditions in the North Sea, especially as regards visibility, are not favorable to reconnaissance operations carried out

at a great distance from the carrier, due to the danger that the planes will get lost. In the last PZ exercise the reconnaissance planes established contact with the enemy eight minutes before contact was made by the light cruisers.

The enemy main body was located and reported by air craft 23 minutes before it was sighted from a ship of the battle fleet.

Spotting.

Successful spotting has been done from air planes. The greatest difficulty lies in the identification of targets fired at. It is, however, considered that greater proficiency in this operation will be rapidly obtained, and it is thought possible that one plane may be able to spot for as many as four ships.

Successful spotting demands freedom from attack by enemy planes, and therefore the spotting planes must be accompanied by a sufficient number of fighting planes to maintain supremacy of the air.

Fighting.

As pointed out in the above paragraph, the efficiency of the spotting plane will be negligible unless the fighting planes are sufficiently numerous to maintain the supremacy of the air in the vicinity of the planes engaged in spotting.

In addition to this requirement, the fighting planes form the principal defense against the torpedo planes of the enemy, and the greatest protection of their own torpedo planes against the enemy fighting planes.

Torpedo Firing.

The development of the torpedo-carrying plane has not been as rapid as the developments in the other lines, but a satisfactory start has been made. In practice a short time ago, five torpedo planes fired torpedoes at a destroyer making 20 knots speed and three of the five made hits with their torpedoes.

TYPES OF PLANES IN USE.

There are at present but two types of air planes in use in the Grand Fleet, namely:

Reconnaissance or spotting planes.
Fighting planes.

The torpedo planes are in use in the training aerodromes, but as yet none have been supplied to the fleet.

Reconnaissance Planes.

These planes are technically designated as one and a half strutters. Their radius of action, in time, is about three hours. The engine is of the rotary type and develops in the neighborhood of 130 horsepower. The machine is a two-seater.

These planes are fitted with wind bags which, when not inflated for buoyancy on the water, are carried in a folded state on the underside of small planes, one on each side, attached to the fuselage. The bags in this condition are not in the way and do not interfere with the flight of the machine.

These wind bags are filled before a plane lands in the sea and furnish buoyancy to keep the plane afloat several hours. The bags are filled with air from a flask containing compressed air. This flask is connected by a pipe to these bags and the operator has only to open a valve to fill the bags with air.

Experience has shown that landing on the water while the ordinary form of land plane landing gear is attached (wheels supported by struts from the fuselage) is dangerous as the resistance of the water to the movement of the wheels is apt to capsize the machine. Two methods are being used to counteract this:

(*a*) Some planes are not fitted with wheels, but with landing gear of the skid type at front of which is a small plane designed to take the water and raise the forward part of the machine to keep it from capsizing.

(*b*) In the other type the ordinary landing gear, consisting of wheels supported from struts, is made detachable so that the pilot before striking the water can detach this landing gear and land directly on the bottom of the fuselage and the small planes supporting the air bags.

These planes are fitted with radio for both sending and receiving. The radio generators are driven by wind pressure, as in the types now in use in the United States, but have one modification of interest, which is this, the propeller on which the wind acts to drive the generator is so arranged that its distance from the fuselage can be varied. By varying this distance the wind pressure is varied, due to the change in the amount of interference caused by the eddy currents of the machine, and consequently the power of the radio set can be changed.

The radio sets are of the continuous-wave type. The tuning is not as sharp as is desired. In consequence of the great amount of radio work going on in the fleet, only 14 different wave lengths can be assigned to the air craft. Five of these waves are used for the reconnaissance reports, and the other 9 waves retained for the use of the spotting airplanes.

These machines have detachable wings, and are stowed with the wings detached. The wing spread is about 43 feet.

Fighting Planes.

The fighting machines are of the Sopwith "Camel" type. They are single-seaters. The engines are of the rotary type and develop about 150 horsepower. The wing spread is about 27 feet.

These machines carry machine guns, and on special occasions have been fitted to carry 50-pound bombs. Under ordinary conditions no bombs will be carried.

The special features of this type are its high speed and climbing ability. They have been found very suitable for use where the distance available for taking off was very limited. The two-seaters, however, are capable of flying from turrets.

A few of these planes are fitted with radio, but the majority of them have no radio and are for use solely as fighting machines.

These planes are divided into two parts to facilitate stowage; the separation is different than in the two-seaters previously described. In this type the wings are permanently attached. The fuselage is in two parts, being divided at a point about one-quarter of the length of the fuselage from its forward end.

These planes are not at present fitted with air bags, but new designs are being prepared to permit these planes to carry them. When the present type planes strike the water they sink until only a small portion of the tail is exposed. There is a buoyancy chamber in the fuselage to give them sufficient buoyancy to prevent them from sinking entirely.

In order to facilitate the recovery of these planes, especially the engine, a wire sling is led from that portion of the fuselage containing the engine to the tail. By the use of this sling it is hoped that the destroyers can at least save the engine of a plane that has been forced to descend on the water.

Torpedo Planes.

It was stated that the torpedo planes were somewhat larger than the reconnaissance planes, but that they obtained most of their additional power by increasing the power of the engine.

Practice flights have been conducted successfully. Much skill is required, as torpedoes dropped at elevations above 25 feet are apt to be failures.

The range at which they strive to fire the torpedo is 600 yards.

The torpedoes carried are small, having a total weight of about 1,100 pounds. The weight of charge was said to be about 260 pounds.

Doubt was expressed as to the efficiency of such a small charge in sinking a major ship, but it is hoped that, at least, a hit will cause

several compartments to be flooded and consequently reduce the speed of the enemy ship to such an extent that it may be overhauled.

AIRPLANE CARRIERS.

Airplanes are now carried on Battleships, Battle Cruisers, Light Cruisers, and in special ships called Airplane Carriers.

The airplane carriers in use or contemplated as being available for service in the near future are as follows:

Name.	*Displacement.*	*Speed.*	*Planes carried.*	*In service.*
Furious	19,500	32	14 reconnaissance 6 fighting	Yes.
Argus	15,750	20	20 torpedo planes	No planes in commission.
Campania	19,000	21	9 reconnaissance 6 seaplanes	Yes.
Vindictive	9,750	30	6 reconnaissance 2 fighting	About ready.
Pegasus	3,300	20	4 reconnaissance 5 fighting	Yes; for training.
Nairana	3,050	19	4 reconnaissance 4 fighting	Do.
Hermes	10,750	25	25 reconnaissance	Late 1918.
Eagle	23,000	24	23 torpedo planes	1919.

NOTE.—The above figures are from memory and may not be accurate, but they are sufficiently accurate to indicate the nature of the carrier and the planes it carries.

H. M. S. Furious.

The *Furious* was originally designed as a cruiser having great speed and carrying two 18-inch guns. These guns were in two turrets—one forward and one aft. There is very little armor protection. The lessons of the Battle of Jutland with regard to armor and the necessity for airplane carriers caused a decision to be made to alter this ship to be an airplane carrier.

The *Furious* now carries 20 planes, 14 reconnaissance planes and 6 fighting planes. These planes are stowed in holds both forward and aft. The planes are stowed in a knocked-down condition as explained under types of planes.

The planes are assembled for flight on the flying-off deck or the flying-on deck. They are transported to this deck by large elevators, about 25 by 40 feet, which elevators are part of the weather deck when in their raised position. One elevator is run by electric power,

one by hydraulic power. Preference was expressed for the hydraulic power.

There is a flying-off deck forward and a flying-on deck aft. The principal difference between these decks is that the flying-off deck conforms to the lines of the hull of the ship and inclines quite rapidly near the bow, while the flying-on deck is flat and is practically of the same width at all points, this width being approximately that of the beam of the ship.

The two decks are joined by runways of sufficient breadth to permit moving planes stowed in the forward hold to the after deck or vice versa. Fighting planes may be flown off the flying-on deck if desired, because of the facility with which these planes take the air.

When a plane is about to make a landing, the ship is headed into the wind at fast speed. The actual speed of the plane over the deck at the time for landing is therefore the difference between the speed of the plane and the apparent wind caused by the movement of the ship and the force of the actual wind.

The only device in use on the *Furious* to aid in stopping the planes when landing, after the plane has touched the deck, is a net constructed of manila rope, about 2-inch, which is supported and suspended from two booms which stand vertically on each side of the deck at the forward end of the flying-on deck.

On several occasions planes have run into this net upon landing, and while the contact of the plane with the net has usually ruined the wings of the machine and sometimes damaged the fuselage, in each case the pilot has escaped injury and the engine of the plane has been uninjured.

The facilities for repair work on board are very limited. Minor repairs and routine overhauls can be made on board. Major repairs and extensive overhaul is made on shore at the Aerodrome.

Spares of all descriptions are carried, including spare wings, propellers, and engines.

On account of recent experience in the North Sea, in which the *Furious* was bombed by enemy sea planes, the antiaircraft battery has been increased from two to five 3-inch Antiaircraft Guns. Six Lewis Machine Guns have also been mounted for use against aircraft.

The personnel employed in handling and operating the machines is mostly of the Royal Air Force, though there are several officers who hold commissions in the Navy who are assigned to duty with the Air Force.

As the primary duty of the Battle Cruiser Squadron, with which the *Furious* cooperates, is reconnaissance. Most of her planes, as has been stated, are of the reconnaissance type.

H. M. S. "Argus."

The *Argus* is a new ship, just placed in commission a few weeks ago, and it is understood to have left the builder's hands in such poor shape that it will be some time before she is ready to take active part in maneuvers.

This ship's design was changed during building to make her an aircraft carrier, but the design was made early enough in her state of construction to permit the installation of a complete flying deck without obstructions of any nature. She has no masts and her funnel leads aft under the flying deck. At a distance a beam view resembles a floating dry dock.

The flying deck is level except for two ramps. These ramps assist the planes in lighting by tending to stop their speed. Between these ramps are suspended wires. When the machine gets between these ramps the wheels take against these wires and the friction assists in arresting the machine. In addition to these measures for stopping the planes, there will be a net of rope as used in the *Furious*.

This ship will carry the torpedo planes, but as none are yet ready for service on board ship it will be some time before she is in active service.

Every endeavor has been made to get this vessel to the Fleet as soon as possible in order that experiments might be made in landing on her deck. Sufficient experiments (which are described later) have been made to prove that under fair conditions, landing planes on her deck is practicable.

The *Argus* is to be sent to the dockyard at Rosyth, for the installation of a dummy superstructure and funnel, which in the design will resemble that of the *Eagle*. The object of this is to determine the effects of the air currents induced by this superstructure and funnel on the landing of planes on deck.

(NOTE.—This superstructure was completed and tried, but not considered successful.)

H. M. S. "Vindictive."

The *Vindictive* is not yet in commission, but is expected to be ready soon. She is a cruiser converted to carry planes, but, due to her high speed, 30 knots, will add materially to the effectiveness of the reconnaissance force.

No description or plan of this vessel was seen.

H. M. S. "Pegasus" and H. M. S. "Nairana."

These ships are old cruisers which were the first to be converted into carriers. Each is fitted with a flying-off deck forward but no flying-on deck. They have been retired from active duty with the

Grand Fleet, but are still used for training ships for pilots and air service personnel.

The *Pegasus* and *Nairana* are at Rosyth.

H. M. S. " Hermes."

The *Hermes* is the first ship constructed entirely by design for an airplane carrier. Although her tonnage is but short one-half of that of the *Furious* and less than half that of the *Eagle*, she carries more planes than either one of them.

The present plan is to add the *Hermes* to the reconnaissance force. She will carry 25 reconnaissance planes. Her speed will be 25 knots.

It is hoped that this vessel will be completed by the end of the present year.

H. M. S. " Eagle."

The *Eagle* is a converted battleship of the same type as the *Canada*. She was the *Almirante Chocrane*, building for Chile when the war broke out. For several years she remained on the ways without any work being done on her. It was finally decided to convert her into an airplane carrier.

By changes in her design, such as omitting much of her armor, it is hoped to increase her speed to 24 knots.

This ship will, if the torpedo plane proves successful, be a torpedo-plane ship, according to present plans. She will carry 23 torpedo planes. She should be ready in 1919.

The *Eagle* has a complete flying deck except for a superstructure and funnels. This superstructure, through which the funnels pass, is located all on one side of the ship, the starboard side. It extends over about one-sixth the length of the ship and is about 15 feet wide. By placing this superstructure all on one side of the vessel it is hoped to leave ample room for flying on and it is also hoped that the air currents set up will not seriously interfere. It is to determine this point that the *Argus* is now having a dummy superstructure built on the flying deck, exactly the same as that of the *Eagle*.

Airplanes Carried in Major Ships.

Airplanes are carried in major ships for—

(1) Spotting.
(2) Reconnaissance.
(3) Fighting enemy planes.

The Battle Cruisers will each carry two reconnaissance planes, but at present those ships fitted to carry planes carry one reconnaissance plane and one fighter.

The policy with regard to the battleships is as follows:

Each battleship division must have adequate aircraft to carry on any independent operation.

This requires that the division flagship and relief flagship shall be provided each with one reconnaissance plane to provide for independent reconnaissance and spotting.

Each battleship is to carry two planes, all planes other than those mentioned above being fighting planes.

Of the 33 dreadnaught battleships, 16 will be fitted to carry one reconnaissance and one fighting plane; the other 17 battleships will carry two fighting planes.

These planes are carried on top of the turrets and fly off a platform which rests on metal supports attached to the guns. The great advantage of this method is the turrets can be trained into the apparent wind, thus doing away with the necessity of the ship steaming into the wind during the time the plane is getting away. Also there is no structure to interfere with the turrets.

The great disadvantage of this method is the planes must be sent up before a firing range is reached, and also, that the planes are exposed to the weather at all times.

The advantage of having the large number of additional planes that can be carried by this method is so great that the disadvantages are completely overshadowed.

Air Planes in Light Cruisers.

The airplanes carried in the light cruisers are of the fighting type, but some of them are fitted with radio and have pilots sufficiently expert to send radio messages while flying the plane. These machines are therefore capable of assisting in reconnaissance work. It is believed that light cruisers will eventually carry reconnaissance planes.

Aerodromes.

The great development of air operations in the fleet has made necessary the establishment of several new air stations or aerodromes. Aerodromes have been constructed in the vicinity of each of the fleet bases. These aerodromes must be capable of making all major repairs and have sufficient capacity to keep a number of machines adequate for the work of the fleet always ready for service.

In addition to these stations there have been others established for the training of pilots, notably the stations at East Fortune, near Berwick, and a second station near Dunbar, both of which stations are now in service for training torpedo plane pilots.

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DEVELOPMENTS AND EXPERIMENTS.

Flying-Off Deck.

The practicability of the flying-off deck was practically assured before the first deck was built. The substitution of the airplane for the seaplane, the former requiring a much shorter space for getting away, led to experiments in flying off the deck when the ship was not headed for the wind. This has been frequently done from the flying-on deck of the *Furious;* the flying-on deck has been used in preference to the flying-off deck because it is level. When the deck slopes, as it does in the flying-off deck of the *Furious*, it is very difficult to fly off it in any direction but ahead.

Flying-Off Turrets.

The ease with which machines took the air from flying-off decks led to the development of the flying-off platform on turrets. On October 1, 1917, the first flight of this nature was made from H. M. S. *Repulse.* Since that time the number of flights has increased to 175. There has been put one serious accident. This resulted in the death of the pilot.

There are at present 22 turrets fitted with the flying-off platform. Other turrets are being fitted; the present plan requires that two turrets on each dreadnaught battleship and on each battle cruiser be so fitted.

Flying-On Decks.

The *Furious* at first had no flying-on deck, but during the last year such a deck has been fitted. Numerous experiments have been conducted in flying on this deck, but, as a rule, the landings resulted in practically the complete destruction of the plane wings.

The disadvantages attendant upon landing on this deck are:

(1) The deck is very short for the purpose; this ship has a large central superstructure which can not be disposed of.

(2) The eddy currents of air caused by the funnels and superstructure and by funnel gases seriously interfere with precision in landing.

Because of these disadvantages, which were so serious as to threaten the efficiency of the Air Service, the greatest interest has been displayed in the trials at landing on the deck of the *Argus*, which has just been completed.

The flying-on deck of the *Argus* has no obstructions except two ramps and wire-arresting apparatus previously described.

Before attempting any landings, experiments were conducted to determine the accuracy with which a pilot could touch the deck without attempting to arrest the machine.

Two pilots were employed. They would approach the deck as though they intended to land, but instead of stopping would run along the deck and take off the other end.

About 35 runs of this nature were made. Each time the point at which the landing gear struck the deck was marked it was found that with experience the pilots were able to bring this point nearer and nearer the after end of the deck.

After two days of the experiments, three landings were successfully made. These were all made by one pilot, as the pilot who assisted in the first experiments was taken sick.

The conditions under which these landings were made were as follows:

(1) Wind, 30 miles; ship's speed, 15; ship steaming into wind.
(2) Wind, 30 miles; ship's speed, 12; ship steaming into wind.
(3) Wind, 15 miles; ship's speed, 4; ship steaming into wind.

The first two landings were accomplished with absolute success. The wind dropped just as the third landing was being made and, due to the combination of reduced speed of ship and dropping of the wind, the pilot miscalculated his speed and was forced to land well forward on the deck between the two ramps. Even under these adverse conditions the landing was effected without injury to the pilot and with only minor injuries to the plane.

In view of these experiments the efficiency of the flying-on deck, as in the *Argus*, seems to be proven and has added much to the assurance with which the air plane program is being developed.

Torpedo Planes.

Practice with torpedo planes is carried on whenever the weather is suitable for flights. Trawlers are normally used for targets, but one destroyer is sent to act as a target whenever one is available.

The greatest difficulty experienced with torpedo planes has been due to the necessity of approaching the water very closely before the torpedo is discharged. Unless this is done the torpedo makes a very bad dive and, in addition, the shock of the fall may disarrange its mechanism.

Recommendations.

The Commander in Chief Grand Fleet has recommended that the fleet be supplied with six large modern airplane carriers and that additional carriers be placed under construction to insure against possible losses of carriers.

Lighter-than-Air Craft.

"Lighter-than-Air" Craft are of two general types:

(*a*) Dirigibles.
(*b*) Kite Balloons.

Dirigibles are not suitable for use from ships, due to the difficulties attendant upon relieving pilots and of topping up. Dirigibles may operate from stations on shore in cooperation with the Grand Fleet; such operations are, however, secondary to the escort of convoys and patroling duties in which this type will ordinarily be employed.

In the event of the High Sea Fleet approaching within the area of operations of any dirigible station, such dirigibles as may be available shall be used to assist the Grand Fleet in reconnaissance, or as antisubmarine escort.

Kite Balloons are valuable aids in—

(1) Spotting.
(2) Reconnaissance.
(3) Action.
  (*a*) To observe movements of the enemy behind smoke screens.
  (*b*) To discover submarine and torpedo wakes.

Spotting from Kite Balloons.

The balloon possesses the great advantage over other types of air craft of permitting telephonic communication conversation being maintained continuously between observer and towing ship.

It is particularly useful when the report, to be of any value, must be passed in a very short space of time, such as spotting for gunfire, reporting the presence of a submarine, mine, or track of a torpedo, etc.

The following are quoted to show the results of spotting from kite balloons:

(*a*) On 20 March, 1917, at a mean range of 13,000 yards, balloon flown by firing ship at a height of 2,000 feet, the actual spread of each salvo was given within 50 yards, and all salvos except two were spotted within an error of 100 yards.

(*b*) In April, 1917, spotting was carried out from a balloon flown by a firing ship at a height of 1,200 feet, and mean range of 23,000 yards. The greatest error was 150 yards, and although at a low height, very little shock was felt from the blast of the full charges by two ships firing.

(*c*) On 28 May, 1917, a midshipman observer from a balloon flown from a firing ship at a height of 1,600 feet, and mean range of 11,000 yards, spotted the fall of shot of the last two ships of the division absolutely correct except for two salvos; it was the observer's first experience in a balloon, and 6 salvos fell approximately 200 yards from the target.

Reconnaissance from Kite Balloons.

In clear weather the balloon should give a range of visibility of some 30–40 miles for a fleet, and at least 30 miles for a single large ship.

In September, 1917, a German submarine was sighted from a balloon towed by a destroyer at a distance of 28 miles. The visibility from the destroyer was only 5 miles. The destroyer gave chase, the balloon observer giving the course. The submarine dived when the destroyer came in sight, but the balloon observer was able to follow the wake of the submarine; depth charges were dropped and the submarine ultimately destroyed.

Observations from Balloons When in Action.

General observations from a kite balloon may give the information necessary to maintain touch with the enemy, as it may be possible to see the enemy's funnels or mast behind a smoke screen, and alterations of course of four points or over may be detected.

During trial observations, at a range of about 5 miles, with a balloon at only 600 feet, the observer reported on the movements of a ship which was behind a smoke screen and invisible from the bridge.

During a smoke screen trial in Pentland Firth, at a range of 12,000 yards with a balloon at a height of 1,500 feet, when the enemy were completely hidden from the control stops, the balloon observer reported that he could see 400 yards of clear water between the smoke screen and the enemy, whose movements could be easily observed.

Experiments of submarine attacks have proved that the submarine can be seen a long way in calm weather by means of the feather made by her periscope.

On one occasion, although the submarine was not sighted, the torpedoes, when fired, were seen 8,000 yards away and the track of the torpedoes followed until they came up within 3,000 yards from the ship.

During an exercise attack by a submarine while on passage the submarine was not seen as she waited for the ship with engines stopped, but the observer saw and reported two torpedoes fired, which, though he expected but one, was correct.

At present kite balloons are carried for reconnaissance purposes by one light cruiser in each light cruiser squadron; by the flagship of each Battle Cruiser Division; for spotting purposes by the flagship of each Battleship Division.

When the fleet is at notice of four hours or longer, the balloons are kept on shore at the hangars. Sufficient balloons are kept inflated to supply the needs of the fleet. When the fleet is put on notice of two and a half hours or less the balloons are transferred to their respective ships by drifters or other station craft.

Balloons are carried by the battleships at moderate height, 600 to 800 feet, until the enemy is reported; the balloons are then manned

and the height regulated by the visibility conditions and the conditions governing their efficiency for spotting.

ITALIAN AVIATION.

Source: Reliable.

14 June 1919.

(11714C.)

The following figures are considered correct for November 11, 1918:

Officer pilots	1,132
Enlisted pilots	2,048
Officer machine gunners	630
Enlisted men	96,000
Officer observers	527
Military specialists and workmen in factories and camps	120,000
Total	220,337

BRITISH AIR SERVICE.

Source: Reliable.

May 1919.

(11714C.)

The British House of Commons has passed the Air Service Bill appropriating £66,500,000. The bulk of this will go to the military, only £3,000,000 going to the development of civilian aviation. There has been a great deal of criticism in the British press of this subordination of civilian to military needs. However, Gen. Sykes, Controller General of Civilian Aviation, has his arrangements so well advanced that extensive civilian aviation will be launched almost immediately.

Both aeroplanes and airships are to be developed. The heavier aircraft are not being neglected, and some very large freight-carrying aeroplanes are on the stocks. Also, the development of trans-ocean aircraft is being pushed ahead.

BOMBING AND GUNNERY.

Source: Naval Aviation Service.

17 June 1919.

The quarterly gunnery practice has been completed with the exception of Bomb Dropping Practice No. 4 (Live Bombs). Bombs for this practice have not arrived from the Bureau of Ordnance.

Although the scores made during the last quarter were excellent, the scores made during this practice showed from 10 to 25 per cent improvement. This was due largely to the fact that planes and equipment were in much better shape because of the additional time allotted for preparation for the practice.

Excellent results were obtained with the 6-pounder Davis non-recoil gun. A Lewis aircraft gun, No. 8815, which has been in use on the station for several months, fired 2,430 rounds of ammunition without breakage or a stoppage. By replacing a mainspring, the gun was used to complete the practice without additional trouble, firing 210 more rounds.

OPERATIONS.

ALLIED WAR VESSELS LOST DURING THE WAR.

Source: Reliable. **20 March 1919.**

(11518.)

ENGLAND.

Name.	*Displacement.*	*Remarks.*
Battleships:		
Audacious	23,400	Sunk by mine, 27 October, 1914.
Britannia	16,600	Sunk by submarine off Gibraltar, 9 November, 1918.
Bulwark	15,250	Blew up off Sheerness, 26 November, 1914.
Cornwallis	14,200	Sunk by submarine off Malta, 11 January, 1917.
Formidable	15,250	Sunk by submarine in Channel, 1 January, 1915.
Goliath	12,950	Sunk by torpedo boat off Dardanelles, 13 May, 1919.
Irresistible	15,250	Sunk off Dardanelles, 18 March, 1915.
King Edward VII	16,600	Sunk by mine, 6 January, 1916.
Majestic	15,150	Sunk by submarine in Dardanelles, 27 May, 1915.
Ocean	13,150	Sunk in Dardanelles, 18 March, 1915.
Russell	14,200	Sunk by mine in Mediterranean, 27 April, 1916.
Triumph	12,200	Sunk by submarine in Dardanelles, 25 May, 1915.
Vanguard	19,600	Blew up through internal explosion, 9 July, 1917.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Battle Cruisers:		
Indefatigable	19,000	Sunk at battle of Jutland, 31 May, 1916.
Invincible	17,600	Sunk at Battle of Jutland, 31 May, 1916.
Queen Mary	27,500	Sunk at Battle of Jutland, 31 May, 1916.
Cruisers:		
Aboukir	12,200	Sunk by submarine in North Sea, 22 September, 1914.
Argyll	11,000	Wrecked on east coast of Scotland, 28 October, 1915.
Black Prince	13,750	Sunk at Battle of Jutland, 31 May, 1916.
Brilliant	3,450	Sunk as blockship at Ostend, 23 April, 1918.
Cressy	12,200	Sunk by submarine in North Sea, 22 September, 1914.
Defence	14,800	Sunk at Battle of Jutland, 31 May, 1916.
Drake	14,300	Torpedoed off North Coast, 2 October, 1917.
Good Hope	14,300	Sunk by *Scharnhorst* and *Gneisenau* off Valparaiso, 1 November, 1914.
Hampshire	11,000	Sunk by mine off Orkney Islands, 5 June, 1916.
Hawke	7,450	Sunk by submarine in North Sea, 15 October, 1914.
Hogue	12,200	Sunk by submarine in North Sea, 22 September, 1914.
Intrepid	3,600	Sunk as blockship at Zeebrugge, 23 April, 1918.
Iphigenia	3,450	Sunk as blockship at Zeebrugge, 23 April, 1918.
Monmouth	9,950	Sunk by *Scharnhorst* and *Gneisenau* off Valparaiso, 1 November, 1914.
Natal	------	Blew up, 31 December, 1918 (internal explosion).
Sirius	3,450	Sunk as blockship at Ostend, 23 April, 1918.
Thetis	3,450	Sunk as blockship at Zeebrugge, 23 April, 1918.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Cruisers—Continued.		
Vindictive	5, 850	Sunk as blockship at Ostend, 10 May, 1918.
Warrior	13, 750	Sunk at Battle of Jutland, 31 May, 1916.
Light Cruisers:		
Amphion	3, 500	Sunk by mine in North Sea, 6 August, 1914.
Arethusa	3, 560	Sunk by mine in North Sea, 11 February, 1916.
Cassandra	3, 800	Sunk by mine off Riga, 4 December, 1918.
Falmouth	5, 300	Sunk by submarine in North Sea, 19 August, 1916.
Nottingham	5, 530	Sunk by submarine in North Sea, 19 August, 1916.
Pathfinder	3, 000	Sunk by submarine in North Sea, 5 September, 1914.
Pegasus	2, 200	Sunk by *Konigsberg* at Zanzibar, 20 September, 1914.
Monitors:		
M–30	355	Sunk in Mediterranean, 13 May, 1916.
M–15	540	Sunk by submarine in Mediterranean, 11 November, 1917.
M–21	540	Sunk by mine, Belgian coast, October, 1918.
M–28	540	Sunk by *Goeben*, 20 January,1018.
Glatton		Sunk by internal explosion at Dover, 16 September, 1918.
Raglan	6, 150	Sunk by *Goeben*, 20 January,1918.
Gunboats:		
Hazard	1, 070	Sunk by collision, 28 January, 1918.
Torpedo Boats:		
Jason	810	Sunk by mine, 7 April, 1917.
Niger	810	Sunk by submarine off Deal, 11 November, 1914.
Speedy	810	Sunk by mine, 3 September, 1914.
Seagull	735	Sunk by collision in Clyde, 30 September, 1918.
Sloops:		
Alyssum	1, 250	Sunk by mine, coast of Ireland, S. W., 18 March, 1917.
Anchusa	1. 275	Torpedoed, sunk, 16 July, 1918.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Sloops—Continued.		
Arabis	1,250	Sunk by torpedo boat in North Sea,10 February, 1916.
Arbutus	1,250	Torpedoed in Irish Sea, 16 December, 1917.
Aster	1,200	Sunk by mine in Mediterranean, 4 July, 1917.
Begonia	1,200	Lost with all on board, October, 1917.
Bergamot	1,275	Sunk by submarine in Atlantic, 13 August, 1917.
Blackmorevale	750	Sunk by mine, 1 May, 1918.
Candytuft	1,275	Sunk by submarine in Mediterranean, 18 November, 1917.
Cosslip	1,275	Torpedoed off Cape Spartel, 25 April, 1918.
Gaillardia	1,275	Sunk in channel, 23 March, 1918.
Genista	1,275	Sunk by submarine in Atlantic, 23 October, 1916.
Kempton	1,250	Sunk.
Lavender	1,250	Sunk by torpedo in Channel, 5 May, 1917.
Mignonette	1,250	Sunk by mine off Irish coast, S. W., 17 March, 1917.
Nasturtium	1,275	Sunk by mine in Mediterranean, 27 April, 1916.
Primula	1,275	Sunk by submarine in Mediterranean, 1 March, 1916.
Ludlow	810	Sunk.
Redear	810	Do.
Rhododendron	1,275	Torpedoed in North Sea, 5 May, 1918.
Salvia	1,250	Sunk by submarine off west coast of Ireland, 20 June, 1917.
Tulip	1,250	Sunk by submarine in Atlantic, 30 April, 1917.
River Gunboats:		
Comet	-------	Sunk on Tigris, November, 1915.
Firefly	-------	Do.
Shaitan	-------	Do.
Flotilla Leaders:		
Hoste	1,566	Sunk by collision in North Sea, 21 December, 1916.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Flotilla Leaders—Continued.		
Scott	1,740	Sunk by submarine, 15 August, 1918.
Tipperary	1,740	Sunk at Battle of Jutland, 31 May, 1916.
Destroyers:		
Ardent	935	Sunk at Battle of Jutland, 31 May, 1916.
Ariel	765	Sunk by mine in Heligoland Bay, 2 August, 1918.
Arno	750	Sunk by collision in Mediterranean, 23 March, 1918.
Attack	785	Sunk by mine off Alexandria, 30 December, 1917.
Bittern	360	Sunk by collision in Channel, 4 April, 1918.
Brisk	780	Sunk by mine in North Sea, 2 October, 1917; position marked.
Boxer	285	Sunk by collision in Channel, 8 February, 1918.
Cheerful	370	Sunk by mine off Shetland Islands, 30 June, 1917.
Contest	955	Sunk by submarine, 18 September, 1917.
Coquette	355	Sunk by mine in North Sea, 7 March, 1916.
Cornet	747	Sunk by submarine in Mediterranean, 6 August, 1918.
Derwent	550	Sunk by mine off Havre, May 2, 1918.
Eden	560	Sunk by collision in Channel, 18 June, 1916.
Fairy	380	Sunk after collision with submarine, 31 May, 1918.
Falcon	375	Sunk by collision in Channel, 1 May, 1918.
Flirt	380	Sunk during action in Channel, 27 October, 1916.
Foyle	550	Sunk by mine off Dover, 15 March, 1917.
Fortune	950	Sunk at Battle of Jutland, 31 May, 1916.
Ghurka	990	Sunk by mine in Channel, 8 February, 1917.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Destroyers—Continued.		
Goldfinch	760	Wrecked.
Itchen	550	Sunk by submarine in North Sea, 6 July, 1917.
Kale	545	Sunk by mine in Channel, 27 March, 1919.
Lafforey	995	Sunk by mine off Dunkerque, 23 March.
Lassoo	1,000	Sunk by mine in North Sea, 13 August, 1916.
Lightning	320	Sunk by mine in North Sea, 30 June, 1916.
Louis	1,050	Wrecked off coast of Gallipoli, November, 1915.
Lynx	935	Sunk by mine off Moray Firth, 9 August, 1915.
Maori	1,030	Sunk by mine in North Sea, 7 May, 1915.
Marmion	1,030	Sunk by collision in North Sea, 21 October, 1917.
Mary Rose	1,025	Sunk by German cruiser, 17 October, 1917.
Medusa	1,010	Sunk by collision in North Sea, 25 March, 1916.
Myrmidon	370	Sunk by mine in Channel, 26 March, 1917.
Marborough	1,010	Wrecked and lost on coast of Ireland, 12 January, 1918.
Negro	1,030	Sunk by collision in North Sea, 21 December, 1916.
Nessus	1,020	Sunk by collision in North Sea, 8 September, 1918.
Nestor	1,000	Sunk at Battle of Jutland, 31 May, 1916.
Nomad	1,000	Sunk at Battle of Jutland, 31 May, 1916.
North Star	1,030	Sunk by mine at attack of Zeebrugge, 23 April, 1918.
Nubian	1,062	Damaged by torpedo; with portions of *Nubian and Zulu* the *Zulian* was constructed.
Opal	1,000	Lost on coast of Ireland, 12 January, 1918.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Dis-place-ment.*	*Remarks.*
Destroyers—Continued.		
Paragon	920	Sunk by torpedo in engagement with German torpedo boats off Ramsgate, 18 March, 1918.
Partridge	1,020	Sunk by German destroyers off Norway (convoy), 12 December, 1917.
Pellew	-------	Brought to Scapa Flow after action, 12 December, 1917.
Pheasant	1,025	Lost off Orkney Islands, 1 March, 1917.
Phoenix	765	Torpedoed by submarine, 14 May, 1918.
Pincher	975	Wrecked, 24 July, 1918.
Raccoon	920	Lost with all on board on coast of Ireland, 9 January, 1918.
Recruit	385	Sunk by submarine off Galloper, 1 May, 1915.
Recruit (new)	1,000	Sunk by mine in North Sea, 9 August, 1917.
Setter	1,050	Sunk by collision in North Sea, 17 May, 1917.
Shark	935	Sunk at Battle of Jutland, 31 May, 1916.
Simoon	1,075	Sunk during action in North Sea, 23 January, 1917.
Sparrowhawk	935	Sunk at Battle of Jutland, 31 May, 1916.
Staunch	748	Sunk by submarine in Mediterranean, 11 November, 1917.
Strongbow	900	(*Breumer* and *Bresme*) in North Sea, 17 October, 1917.
Success	385	Wrecked off Fifeness, 27 December, 1914.
Surprise	910	Sunk off Hook of Holland by a mine, 23 December, 1917.
Tornado	1,080	Sunk off Hook of Holland by a mine, 23 December, 1917.
Torrent	1,040	Sunk off Hook of Holland by a mine, 23 December, 1917.
Turbulent	1,100	Sunk at Battle of Jutland, 31 May, 1916.
Ulleswater	915	Sunk by mine, 15 August, 1918.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Destroyers—Continued.		
Ulysses	1,090	Sunk by collision, 28 October, 1918.
Vehement	1,300	Sunk by mine in Bay of Heligoland, 3 August, 1918.
Velox	420	Sunk by mine off Nab Lightship, 25 October, 1915.
Wolverine	985	Sunk by collision off coast of Ireland, 12 December, 1917.
Zubian		Sunk(?) by mine in Channel, 23 March, 1918.
Zulu	1,027	Damaged by torpedoes; with sections of *Zulu* and *Nubian* the *Zubian* was constructed.
Torpedo Boats:		
9	220	Lost by collision in North Sea, 26 July, 1916.
10	220	Sunk by submarine in North Sea, 10 June, 1915.
11	250	Sunk by mine in North Sea, 7 March, 1916.
12	250	Sunk by submarine in North Sea, 10 June, 1915.
13	250	Sunk by collision in North Sea, 26 January, 1916.
24	270	Sunk in outer port of Dover, 26 January, 1917.
90	130	Sunk during bad weather, 25 April, 1918.
96	135	Sunk by collision off Gibraltar, 1 November, 1915.
046	80	Sunk, 27 December, 1915.
117	195	Sunk by collision in Channel, 10 June, 1917.
Submarines:		
AE–1	800	Sunk through accident, 19 September, 1915; cause unknown.
AE–2	800	Sunk in Dardanelles, May, 1915.
C–3	316	Sunk at Zeebrugge, 23 April,1915.
C–26	320	Destroyed at Helsingfors, 8 April, 1918.
C–27	320	Sunk at Helsingfors, 8 April,1918.
C–29	320	Sunk by mine, 29 August, 1915.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Submarines—Continued.		
C–31	320	Sunk off Belgian coast, about 5 January, 1915.
C–32	320	Lost in Baltic, October, 1917.
C–33	320	Lost in North Sea, about 7 August, 1915.
C–34	320	Sunk by submarine in North Sea, 19 January, 1917.
C–35	320	Sunk at Helsingfors, 8 April,1918.
D–2	620	Lost in North Sea, 1 December, 1914.
D–3	620	Lost in Channel by French seaplane, 12 March, 1914.
D–5	620	Sunk by mine in North Sea, 3 November, 1914.
D–6	620	Lost, July, 1918.
E–1	650	Destroyed at Helsingfors, 8 April, 1918.
E–3	650	Must have sunk in North Sea, 18 October, 1914.
E–5	650	Lost.
E–6	650	Sunk by mine, 26 December,1915.
E–7	650	Lost at Dardanelles, September, 1915.
E–8	650	Destroyed at Helsingfors, 8 April, 1918.
E–9	650	Do.
E–10	650	Lost in North Sea about 21 January, 1915.
E–13	650	Wrecked off Saltholm, 19 August, 1915 (interned).
E–14	650	Sunk in Dardanelles, 18 January, 1918.
E–15	650	Wrecked in Dardanelles, April, 1915.
E–16	650	Lost in North Sea, 22 August, 1916.
E–17	650	Wrecked in January, 1916.
E–18	660	Lost.
E–19	660	Destroyed at Helsingfors, 3 April, 1918.
E–20	660	Sunk at Dardanelles, November, 1915.
E–22	660	Sunk in North Sea, 25 April, 1916.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Submarines—Continued.		
E–24	660	Lost.
E–26	660	Lost in North Sea, 6 July, 1916.
E–30	660	Lost in North Sea, November, 1916.
E–34	660	Lost in North Sea, July, 1918.
E–36	660	Lost in North Sea, 13 January, 1917.
E–37	660	Lost in North Sea, December, 1916.
E–47	.....	Lost in North Sea, August, 1917.
E–49	.....	Lost off Shetlands, March, 1916.
E–50	.....	Lost in North Sea, February, 1918.
G–8	695	Lost in North Sea, January, 1918.
G–9	695	Lost in North Sea, September 16, 1917.
H–3	435	Lost in Adriatic, 15 July, 1916.
H–5	435	Sunk through collision in Irish Sea, 2 March, 1918.
H–6	435	Wrecked, January, 1916.
H–10	435	Lost in North Sea, January, 1918.
J–6	1,170	Lost in North Sea, 15 October, 1918.
K–1	2,650	Lost through collision, 18 November, 1917.
K–4	2,650	Sunk through collision in North Sea, 31 January, 1918.
K–17	2,650	Do.
L–10	1,125	Sunk by German destroyer in North Sea, 30 October, 1918.
Ships for Carrying Seaplanes:		
Ben My Chree	2,600	Sunk by gunfire off Asia Minor, 11 January, 1917.
Hermes	5,600	Sunk by submarine in Channel, 31 October, 1914.
Mine Layers:		
Ariadne	.....	Sunk by submarine in Channel, 26 July, 1917.
Princess Irene	.....	Blew up at Sheerness, 27 May 1915.
Alcantara	.....	Sunk during action in North Sea, 29 February, 1916.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Dis-placc-ment.*	*Remarks.*
Mine Layers—Continued.		
Avenger	-------	Torpedoed by submarine and sunk in North Sea, June 14, 1917.
Bayano	-------	Sunk by submarine off Clyde, 11 March, 1915.
Calgarian	-------	Torpedoed, 1 March, 1918.
Campania	-------	Torpedoed, South of Ireland, 23 July, 1918.
Champagne	-------	Torpedoed by submarine in North Sea, 9 October, 1917.
Clan MacNaughton	-------	Lost in North Atlantic, January, 1915.
Ermine	-------	Torpedoed in Aegean Sea, 2 August, 1917.
Fiona, A. B. S	-------	Wrecked in North Sea, 6 September, 1917.
Grive, A. B. S	-------	Torpedoed in North Sea, 29 December, 1917.
Hilary	-------	Torpedoed in Atlantic, 25 May, 1917.
Armed Merchant Cruisers:		
India	-------	Sunk by submarine off coast of Norway, 8 August, 1915.
Laurentic	-------	Sunk by mine off coast of Ireland, 25 January, 1917.
Louvain, A. B. S	1,830	Torpedoed in North Sea, 20 January, 1918.
Marmora	10,500	Torpedoed south of Ireland, 23 July, 1918.
Meldavia	9,500	Torpedoed, May 23, 1918.
Oceanic	-------	Wrecked off Shetland Islands, 8 September, 1914.
Orama	12,900	Torpedoed in North Sea, 19 October, 1917.
Otranto	12,100	Sunk by collision, 6 October, 1918.
Otway	-------	Torpedoed in Atlantic, 22 July, 1917.
Patia	6,100	Torpedoed, 13 June, 1918.
Sarnia	-------	Torpedoed, 12 September, 1918.
Snagfell, A. B. S	1,570	Torpedoed, 5 June, 1918.
Stephen Furness	1,700	Torpedoed in North Sea, 29 December, 1917.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Armed Merchant Cruisers—Continued.		
Tithonus	3,500	Torpedoed in North Sea, 28 March, 1918.
Viknor		Lost off coast of Ireland, 13 January, 1915.
Hospital Ships:		
Glenart Castle		Sunk in Bristol Channel, 26 February, 1918.
Llandovery Castle		Sunk 100 miles off Fastnet, 27 June, 1918.
Rewa		Sunk in Bristol Channel by submarine, 4 January, 1918.
Rohilla		Wrecked off Whitby, 30 October, 1914.
Warilda		Sunk in Channel, 3 August, 1918.
Armed Vessels for Ramming Submarines:		
Duke of Albany		Sunk by submarine in North Sea, 25 August, 1916.
Dundee		Sunk by submarine in Channel, 3 September, 1917.
Marcella		Sunk by collision in North Sea, 24 March, 1916.
Fauvette		Sunk by mine in North Sea, 9 March, 1916.
Tara		Sunk by submarine in eastern Mediterranean, 5 November, 1915.
The Ramsey		Sunk by *Meteor* in North Sea, 8 August, 1915.
Mine Sweepers:		
Clacton		Sunk by submarine in Mediterranean, August, 1916.
Napaulin		Sunk by mine off Dunkerque, 20 April, 1917.
Newmarket		Disappeared in Mediterranean, 25 July, 1917.
Armed Sloop:		
Sumana		Sunk in Tigris, 23 April, 1916.
Patrols:		
P–13	615	Sunk by collision, 4 November, 1918; repaired.
P–26	615	Sunk by mine, 10 April, 1917.

Allied war vessels lost during the war—Continued.

ENGLAND—Continued.

Name.	*Displacement.*	*Remarks.*
Trawlers:		
9	-------	Sunk during raid of German torpedo boats in Channel, 15 February.
Dirigible:		
C–26	-------	Interned in Holland, December 12, 1917.

FRANCE.

Battleships:		
Bouvet	12,200	Sunk by mine in Dardanelles, 18 March, 1915.
Danton	18,400	Sunk by submarine off coast of Corsica, 18 March, 1917.
Gaulois	11,300	Sunk by submarine in Mediterranean, 27 December, 1916.
Suffren	12,700	Sunk by submarine on voyage from Gibraltar to Lorient, 26 November, 1916.
Cruisers:		
Admiral Charner	4,800	Sunk by submarine off coast of Syria, 8 February, 1916.
Chateaurenault	7,950	Torpedoed by submarine, south of Channel of Otranto, 14 December, 1917.
Du Petit Thouars	9,500	Torpedoed in convoy in Atlantic, August 7, 1918.
Kleber	7,700	Sunk by mine in Iroise, 27 June, 1917.
Leon Gambetta	12,600	Sunk by Austrian submarine in Channel of Otranto, night of April 26–27, 1915.
Gunboats:		
Surprise	620	Sunk by submarine in Funchal, December 3, 1916.
Zelee	560	Sunk at Papeete, Tahiti, by German cruisers *Scharnhorst* and *Gneisenau*, 22 September, 1914.
Sloop:		
Rigel	1,250	Sunk by submarine off Algiers. 2 October, 1916.

Allied war vessels lost during the war—Continued.

FRANCE—Continued.

Name.	*Displacement.*	*Remarks.*
Destroyers:		
Branlebas	330	Sunk by mine off coast of Flanders, about 9 November, 1915.
Boutefeu	770	Sunk by mine at Brindisi, May 15, 1917.
Catapulte	330	Sunk by collision May, 1918.
Carabinier	-------	Stranded and exploded, November 14, 1918.
Dague	-------	Sunk in port of Antivari, February 24, 1915 (mine).
Dax (Greek, transferred to French flag).	-------	Sunk 28 June, 1917 (torpedoed).
Standard	400	Sunk by torpedo by German destroyers on banks of Flanders, April 25, 1917.
Fantassin	470	Sunk by collision in Mediterranean, 5 June, 1916.
Faulx	770	Sunk by collision, April, 1918.
Fourche	770	Sunk by submarine in Channel of Otranto, 23 June, 1916.
Mousquet	300	Sunk at Penang by the *Emden*, 28 October, 1914.
Renaudin	770	Sunk by submarine in Adriatic, 18 March, 1916.
Yatagen	330	Sunk by collision in Channel, 3 December, 1916.
Torpedo Boats:		
251	97	Sunk by collision in Channel.
300	100	Sunk by mine at Havre, February 1, 1916.
317	100	Sunk by mine at Calais, 28 December, 1916.
319	100	Sunk by mine at Nieuport, January, 1915.
331	100	Sunk by collision at Barfleur, 17 June, 1915.
333	100	Sunk by collision in Mediterranean, 12 March, 1918.
347	100	Sunk by collision in Mediterranean, 9 October, 1914.
348	100	Sunk by collision in Mediterranean, October, 1914.
325	100	Sunk by mine at Kerkennah, 22 January, 1919.

Allied war vessels lost during the war—Continued.

FRANCE—Continued.

Name.	*Displacement.*	*Remarks.*
Submarines:		
Ariane	410	Torpedoed off Bizerte, 19 June.
Bernouille	400	Sunk in Adriatic, 12 February, 1918.
Circe	400	Torpedoed off Cape Rodon, 20 September, 1918.
Curie	400	Sunk at Pola, 23 December, 1914; reported raised by Austrians.
Diane	630	Lost in Adriatic about 10 March, 1918.
Floreal	400	Sunk by collision in Aegean Sea, 2 August, 1918.
Foucault	400	Sunk by Austrian seaplanes in Adriatic, September, 1916.
Fresnel	400	Destroyed by Austrian destroyer while stranded in Adriatic, 5 December, 1915.
Joule	400	Reported sunk in Dardanelles, May, 1915.
Mariotte	530	Sunk in Dardanelles, July 26.
Monge	400	Sunk by Austrians in Adriatic, 29 December, 1915.
Prairial	400	Sunk by collision in Channel, 28 April, 1918.
Saphir	390	Reported as sunk at entrance to Dardanelles, 16 January, 1915.
Turquoise	390	Officially reported by the Turks as sunk 30 October, 1915; refloated by them.
Mine Layers:		
Casablanca	950	Sunk by mine in Aegean Sea, night of June 3–4, 1915.
Cassini	950	Sunk by submarine in Mediterranean, 28 February, 1917.
Armed Merchant Cruisers:		
Burdigala	----------	Sunk by submarine in Mediterranean, 14 November, 1916.
Golo II	----------	Sunk by submarine in Mediterranean, August, 1917.
Corse	----------	Sunk by submarine about 24 January, 1918.
Indien	----------	Sunk by submarine at Rhodes, 8 September, 1915.
Italia	----------	Sunk by submarine between Taranto and Corfu, May 30, 1917.

Allied war vessels lost during the war—Continued.

FRANCE—Continued.

Name.	*Displacement.*	*Remarks.*
Armed Merchant Cruisers—Continued.		
Gallia		Sunk by submarine south of Sardinia, October 4, 1916.
Provence II		Sunk by submarine in Mediterranean, 26 February, 1916.
Santa Anna		Sunk by submarine, May 10,1918.
Special Ship:		
Estafette		Sunk by mine about April, 1916.
Transport:		
Drome		Sunk by mine about January 24, 1918.
Dirigibles:		
Alsace		Brought down by fire of German guns upon its return from bombing expedition, 2 October, 1915.
T		Destroyed by an explosion off Sardinia, 12 May, 1919.
?		A dirigible was destroyed by fire of German antiaircraft guns in neighborhood of Wolferding, west of Saargemund, during night of February 23–24.

RUSSIA.

Battleships:	
Imperatritza	Blew up at Sebastopol, 20 October, 1916 (internal explosion).
Peresvyet	Sunk by mine near Port Said, 4 January, 1917.
Slava	Sunk during engagement at Riga, 16 October, 1917.
Svobodnaya Rossiya	Voluntarily destroyed, 18 June, 1918.
Cruisers:	
Admiral Makharoff	Sunk by mine at Reval, about 28 March, 1918.
Pallada	Sunk by submarine in Baltic, 12 October, 1914.
Prut (ex *Medjidieh*)	Retaken by Turks in May, 1918.

Allied war vessels lost during the war—Continued.

RUSSIA—Continued.

Name.	*Displacement.*	*Remarks.*
Light Cruiser:		
Zhemchug		Sunk by *Emden* at Penang, 28 October, 1914.
Gunboats:		
Bobyr		Captured off Abo, April, 1918.
Sivuvh		Sunk by German cruiser between Riga and Moon Sound, 19 August, 1915.
Destroyers:		
Dobrovoletz		Sunk by mine at Swalferort, 21 August, 1916.
Bditelni		Sunk by mine off Mantyluoto, 27 November, 1917.
Fiodonissi		Partially voluntarily destroyed, 18 June, 1918.
Gadvibey		Do.
Gnevni		Blew up at Sebastopol, May,1918.
Grom		Sunk in action at Oesel, 16 October, 1917.
Isolnitelni		Foundered in Gulf of Finland, 16 December, 1914.
Kaliakra		Partially voluntarily destroyed, 18 June, 1918.
Kertch		Do.
Kasanetz		Sunk by German submarine off Odensholm, 28 October, 1916.
Leit Kep Baranoff		Partially voluntarily destroyed, 18 June, 1918.
Leit Bourakow		Sunk by mine in Baltic, about 13 August, 1917.
Leit Pushchin		Sunk by German submarine off Varna, 9 March, 1916.
Leit Schestakoff		Partially voluntarily destroyed, 18 June, 1918.
Leit Zatzarenhi		Sunk by mine, 1 July, 1917.
Letuchi		Foundered in Gulf of Finland, 16 December, 1914.
Okhotnik		Sunk by mine near Oesel, 26 September, 1917.
Pronsitelni		Partially voluntarily destroyed. 18 June, 1918.
Smyetlivi		Do.
Stremitelni		Do.
Zhivuchi		Sunk by mine off Sebastopol, 28 April, 1916.

Allied war vessels lost during the war—Continued.

RUSSIA—Continued.

Name.	*Displacement.*	*Remarks.*
Submarines:		
Akula		Lost in Baltic, November, 1915.
A. G.–11		Voluntarily destroyed in Baltic, April, 1918.
A. G.–12		Do.
A. G.–13		Do.
A. G.–14		Sunk in Baltic, September, 1917.
A. G.–15		Voluntarily destroyed in Baltic, June 21, 1917.
Bars		Lost in Baltic, June, 1917.
Edimorog		Sunk in Baltic after stranding, February, 1918.
Gepard		Lost in Baltic, October, 1917.
Lvitza		Lost in Baltic, July, 1917.
Morzh		Lost in Black Sea, June, 1917.
Mine Layers:		
Enisei		Sunk by German submarine off Gran Grund Bank in Baltic, 4 June, 1915.
Ladoga		Sunk by German submarine at entrance of Gulf of Finland, 15 August, 1915.
Prut		Sunk off Sebastopol, 29 October, 1914.
Armed Auxiliary Vessel:		
Vasilii Velikii		Lost in Bay of Vaida, White Sea, April, 1916.
Hospital Ships:		
Portugal		Sunk by submarine in Black Sea, 30 March, 1916.
Russ		Sunk in Baltic, May, 1918.
Vperyed		Sunk by submarine in Black Sea, July 10, 1916.
Dirigibles:		
1		Burned in hangar, Sebastopol, March 27, 1917.
1		Destroyed by gunfire in region of Stanislau, April 26, 1917.

Allied war vessels lost during the war—Continued.

JAPAN.

Name.	*Displacement.*	*Remarks.*
Battleship:		
Kawachi	21,800	Blew up through internal explosion, Bay of Tokeuyama, 12 July, 1918.
Battle Cruiser:		
Tsukuba	14,000	Blew up in port of Yokosuka, 14 January, 1917.
Light Cruisers:		
Kasagi	4,900	Wrecked, July, 1916.
Otowa	3,050	Wrecked, July, 1917.
Takachiho (old)	3,700	Torpedoed in Bay of Kiao Tcheou by the *S. 90*, 18 October, 1914.
Destroyers:		
Sakaki	665	Torpedoed in Mediterranean, July, 1917; repaired.
Shirotaye	410	Wrecked in September, 1914; raised but will not be recommissioned.
Tokitsukage	1,250	Wrecked on coast of Kishu, 25 March, 1918.
Torpedo Boat:		
33	90	Sunk by mine in Bay of Kiao Tcheou, 11 November, 1914.

ITALY.

Battleships:		
Benedetto Brin	13,400	Destroyed by explosion.
Leonardo da Vinci	22,500	Sank after explosion on board at Taranto, 2 August, 1916.
Regina Margerita	13,400	Blown up on Italian mine field off Valona, 11 December, 1916.
Protected Cruisers:		
Amalfi	10,200	Sunk by Austrian submarine in Adriatic, 7 July, 1915.
G. Garibaldi	7,350	Sunk by Austrian submarine in Adriatic, 18 July, 1915.
Auxiliary Cruisers:		
Citta di Palermo	.....	Sunk by mine in Adriatic, 8 January, 1916.
Citta di Messina	.....	Sunk by submarine in Channel of Otranto, 23 June, 1916.

Allied war vessels lost during the war—Continued.

ITALY—Continued.

Name.	*Displacement.*	*Remarks.*
Monitor:		
A. Capellini	.....	Sunk off Ancona, 14 November, 1917.
Destroyers:		
Audace	680	Sunk by collision with steamer off Cape Colonna, 29 August, 1916.
Borea	330	Sunk by Austrian cruiser, 15 May, 1917.
B. Cairoli	700	Sunk by collision, 10 April, 1918.
Gabribaldino	416	Sunk by collision, 16 July, 1918.
Intrepido	680	Sunk by mine near Valona, 4 December, 1915.
Impetuoso	680	Sunk by submarine in Channel of Otranto, 10 July, 1916.
Nembo	330	Sunk by submarine in Adriatic, 16 October, 1918.
Partenope	850	Sunk by submarine off Bizerte, 24 March, 1918.
Rossarol	1,030	Sunk in Adriatic, November, 1918.
Turbine	330	Sunk by a cruiser in Adriatic, 24 May, 1915.
Torpedo Boats:		
5 P. N	130	Sunk by Austrian submarine in Adriatic, 26 June, 1915.
17 O. S	130	Seriously damaged by explosion in Adriatic and destroyed by Italians.
Torpedo Boats:		
Perseo	210	Sunk, March, 1917.
Serpente	210	Sunk by mine, June, 1916.
Scorpione	210	Sunk by mine, May 15, 1917.
Submarines:		
Balilla	345	Sunk in Adriatic, June 14–15, 1916.
A. Guglielmotti	700	Sunk by English destroyer, March, 1917.
H–5	335	Sunk by English submarine, 16 April, 1918.
Jalea	250	Probably sunk by Austrian min in Gulf of Trieste, 10 Augus 1915.
Medusa	250	Sunk by Austrian submarine Adriatic, June 9, 1915.

Allied war vessels lost during the war—Continued.

ITALY—Continued.

Name	*Displacement.*	*Remarks.*
Submarines—Continued.		
Nereide	230	Sunk by Austrian submarine in Adriatic, August 3, 1915.
Pullino	345	Captured by Austrians in July, 1916.
H–4	470	Lost in Adriatic about 8 August, 1917.
Gunboat:		
Archimede	-------	Taken by Germans at Odessa, June, 1918.
Transports:		
Sterope	-------	Sunk by submarine April 7, 1918.
Re Umberto	-------	Sunk in Adriatic by mine, December 17, 1915.
Verona	-------	Sank in Adriatic, May 10, 1918.
Dirigibles:		
M–11 (Citta di Ferrara).	-------	Fell southwest of Lussin Island, June 8, 1915, and was burned by crew.
(?)	-------	A dirigible was brought down at Gorizia, May 3, 1916.
P. I.	-------	Destroyed in hangar at Campalto, by Austrian aircraft, 12 August, 1916.
V. I. (Citta di Jesi)	-------	Brought down by shrapnel near Pola, August 5, 1915; said to have been brought to Pola by Austrians.

UNITED STATES.

Cruiser:		
San Diego	15,400	Sunk by mine, 10 July, 1918.
Gunboat:		
Schurz	-------	Sunk by collision, June 21, 1918.
Destroyers:		
Jacob Jones	1,100	Sunk by submarine, 5 December, 1917.
Chauncey	600	Sunk by collision with *Caya*, November 19, 1917.
Submarine:		
F–1	350	Sunk by collision with *F–18* in American waters, December, 1917.

Allied war vessels lost during the war—Continued.

UNITED STATES—Continued.

Name.	*Dis-place-ment.*	*Remarks.*
Yachts:		
Alcedo		Sunk by submarine in Gulf of Gascony, 5 November, 1917.
Guinivere		Stranded, destroyed January 25, 1918.
Wakiva		Sunk, May, 1918.
Trawlers:		
Rehoboth		Sunk, November 5, 1918.
Tampa		Lost at sea, 26 September, 1918.
Collier:		
Cyclops		Lost with all on board, March, 1918.

POST-WAR FLEET ORGANIZATION.

Source: "The Fleet."

May, 1919.

(11539)

Though this article is not confidential, it is published for the information of the Service.

Consequent upon the introduction of the Post-War Fleet Organization, the following changes in nomenclature took place on April 8, 1919:

HOME.

The Grand Fleet ceases to be known as such, and the squadrons at present comprising it are organized as follows:

Fleet Flagship of Atlantic and Home Fleets.—H. M. S. *Queen Elizabeth.*

ATLANTIC FLEET.

First Battle Squadron.—*Revenge* (Flag), *Resolution* (Flag of R. A.), *Ramillies*, *Royal Oak*, *Royal Sovereign.*

Second Battle Squadron.—*Barham* (Flag), *Valiant* (Flag of R. A.), *Malaya*, *Warspite.*

Battle Cruiser Squadron.—*Lion* (Flag), *Princess Royal*, *Renown*, *Repulse*, *Tiger.*

Flying Squadron.—*Furious* (Flag), *Argus*, *Nairana*, *Pegasus*, *Vindex*, *Vindictive*.

First Light Cruiser Squadron.[1]—*Curacoa* (Flag), *Coventry*, *Curlew*, *Danae*, *Dauntless*, *Dragon*.

Broad Pendant of Commodore D.—*Castor*.

HOME FLEET.

Third Battle Squadron.—*King George V* (Flag), *Orion* (Flag of R. A.), *Conqueror*, *Erin*, *Monarch*, *Thunderer*.

Second Light Cruiser Squadron.[2]—*Caledon* (Flag), *Galatea*, *Inconstant*, *Phaeton*, *Royalist*.

Mine-laying Squadron.—*Princess Margaret*.

The squadrons being sent abroad will be as follows:

TO MEDITERRANEAN.

Fourth Battle Squadron.—*Iron Duke* (Flag of Commander in Chief), *Emperor of India* (Flag of R. A.), *Benbow*, *Marlborough*, *Ajax*, *Centurion*.

Third Light Cruiser Squadron.—*Cardiff* (Flag), *Calypso*, *Caradoc*, *Centaur*, *Ceres*, *Concord*.

TO EAST INDIES.

Fourth Light Cruiser Squadron.—*Carysfort* (Flag of Commander in Chief), *Caroline*, *Comus*, *Conquest*.

TO CHINA.

Fifth Light Cruiser Squadron.—*Hawkins* (Flag of Commander in Chief), *Cairo* (Flag of R. A.), *Capetown*, *Carlisle*, *Colombo*.

TO CAPE.

Sixth Light Cruiser Squadron.—*Birmingham* (Flag of Commander in Chief), *Chatham*, *Dublin*, *Lowestoft*.

TO SOUTH AMERICA.

Seventh Light Cruiser Squadron.—*Southampton* (Flag of Commander in Chief), *Dartmouth*, *Weymouth*, *Yarmouth*.

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[1] The Harwich Force ceases to be known as such, but the First Light Cruiser Squadron will continue at Harwich directly under the orders of the Admiralty for the present, and the Fourth and Fifth Destroyer Flotillas will be under the orders of the Rear Admiral Commanding, First Light Cruiser Squadron, temporarily.

[2] Fully manned temporarily—*Cleopatra*, *Comus*, and *Champion* will be also attached temporarily to the Second Light Cruiser Squadron.

TO NORTH AMERICA.

Eighth Light Cruiser Squadron.—*Calcutta* (Flag of R. A.), *Calliope*, *Cambrian*, *Constance*.

Destroyers.—Destroyers on the Mediterranean Station, not belonging to the Sixth Flotilla in the Post-War Fleet, will be attached to that flotilla so long as they remain on the station. All Destroyers and Patrol Boats at Dover will be known as the Dover Patrol Force.

Submarines.—Third Submarine Flotilla will remain under the direct orders of the Admiralty until transferred to Devonport. Fifth Submarine Flotilla (with the exception of vessels already in the Mediterranean) will remain under the direct orders of the Admiralty until arrival on the Mediterranean Station.

CONSTRUCTION AND REPAIR.

RESISTANCE OF STRUCTURAL PARTS OF SHIPS TO UNDERWATER EXPLOSIONS.

Source: Reliable.

11 March 1919.

(11329)

The greater number of experiments carried out were based upon the application of the principles of mechanical similitude and structures geometrically similar, and had for their purpose the determining of the forces of resistance to the action of given quantities of explosives, placed at a depth of 10 to 13 feet, against specially reinforced construction of varied types.

Very few of the experiments gave any definite results as to the situation in general, i. e., the influence of distance or of depth, or the relation of the quantity of the charge to the destructive effect.

Several of the latter experiments, however, demonstrated that the depth at which the charge exploded had no influence whatever upon the damage inflicted on the hull, at least up to the minimum depth at which the experiments were carried out.

This was fully illustrated by an experiment made against a model structure of the *Cavour* type to which was attached a special outside protection. The charges corresponding to 352 pounds of tritolo were exploded at a depth of 36 feet (under the bottom of the model), then of 26 feet, of 23 feet, and of 7 feet.

The rents in the outside plates of the specially protected hull and the dents were practically identical in each case; the dents of the outside plates of the double bottom of the ship (which give a certain measure of proof of its efficacy) were of little consequence, and the largest rent measured only about 4 inches in all four of the experiments.

The case would certainly result otherwise if the charge were exploded against the sides of a battleship as now built, rather than against a ship uniformly protected in its entirety, as in these experiments.

In such a case, if a charge exploded at a greater depth than 6½ feet (the maximum depth of the armor belt) the damage done by the explosion would be of a different character from that caused by a charge exploding at a lesser depth, or against the armor belt, and consequently might give different results.

A charge corresponding to 440 pounds of tritolo was exploded against a structural model of the *Cavour* type at a depth of 11½ feet; that is, against the outside plates of the double bottom. A second charge of the same weight was exploded at a depth of 3 feet, or against the armor belt at 21 feet from its lower edge.

Finally, a third charge at a depth of only 1½ feet was exploded against the armor belt but 3.6 feet above its lower edge. The results obtained from this experiment permit of the following conclusions:

(1) In the first case (immersion depth, 11½ feet) the section under the protected deck suffered most of the damage, and the effects of the explosion extended toward the center line of the ship as far as the center longitudinal bulkheads, causing extensive flooding, which would most likely have caused the loss of the ship and would certainly have put her out of action.

(2) When the charge explodes against the armor belt, the damage to the section under the protected deck is notably less, and becomes less as the depth of the immersion decreases. However, with a charge of 440 pounds, it has been proved that considerable damage might result to the structural parts below the armor belt covering the protected deck, even when the charge is exploded at a depth of only 0.50 m. The inrush of water in the compartments under the protected deck would not, in this case, result in serious consequences, but, on the other hand, the results of the flooding of the sections above the protected deck might result disastrously, on account of the diminution of stability due to the reduction of the moment of inertia of the area of flotation.

But in any case, after examining the damage to the models, it may be said that a charge of 440 pounds, even though exploded at a distance of 1 meter from the ship, is sufficient to put a battleship out of action.

Increasing the charge of above 200 kilograms (440 pounds) would not seem able to produce a sensible increase in its effect at depths greater than 1 meter, if one considers that all underwater explosions of the same weight of charge are notably affected by the depth or nearness to the surface at which the explosion takes place. And, therefore, the proportion of the force of the explosion which acts directly against the hull is only a small fraction of the force of the charge, a proportion which diminishes with the increase of the charge.

ENGINEERING.

INSPECTION OF ENGINES OF SURRENDERED GERMAN SUBMARINES AT HARWICH.

The following report is published as being of especial interest to the submarine officers of the service.

Boat.	Make of Engine.	Number in boat.	Cycle.	Number of cylinders.	Horsepower engine.	Revolutions per minute.	Air.		Year.
							Starting.	Reversing.	
U-19	Man	2	4	6	850	450	Yes.	Yes.	1912
U-53	Man	2	4	6	1,200	450	Yes.	Yes.	
U-55	Man	2	4	6	1,200	450	Yes.	Yes.	1916
U-67	Krupp	2	2	6	(1)	(1)	Yes.	Yes.	
U-79	Vulcan	2	4	6	550	450	Yes.	No.	
U-101	Man	2	4	6	1,200	450	Yes.	Yes.	
U-108	Man	2	4	6	1,200	450	Yes.	Yes.	
U-112	Krupp	2	2	6	1,600	350	Yes.	Yes.	1917
U-114	Krupp	2	2	6	(2)	(1)	Yes.	Yes.	1917
U-117	Man	2	4	6	1,200	(1)	Yes.	Yes.	
U-119	Man	2	4	6	1,200	450	Yes.	Yes.	1917
U-120	Man	2	4	6	1,200	450	Yes.	Yes.	
U-122	Man	2	4	6	1,200	450	Yes.	Yes.	
U-124 [3]	-------	2	4	6	1,200	450	Yes.	Yes.	
U-125	-------	2	4	6	1,200	450	Yes.	Yes.	1917
U-135	-------	2	4	6	1,750	380	Yes.	Yes.	1917
In addition, this vessel has charging engines as follows:									
	Man	2	4	-----	450	400	Yes.	No.	1917
U-139	Krupp	2	2	6	1,600	350	Yes.	Yes.	1915
Designed for one charging engine, but not installed.									
U-141	Man	2	4	6	1,750	380	Yes.	Yes.	1917
In addition, this vessel has one charging engine, as follows:									
	Man	1	4	6	450	400	Yes.	No.	1917
U-146	Man	2	4	6	1,000	450	Yes.	Yes.	1915
U-153	Krupp	2	4	6	(2)	-----	Yes.	No.	1916
U-160	Man	2	4	6	1,200	450	Yes.	Yes.	
U-164	Man	2	4	6	1,200	450	Yes.	Yes.	1917
UB-99	Vulcan	2	4	6	550	450	Yes.	Yes.	
UB-112.	Man	2	4	6	550	450	Yes.	Yes.	1917
UB-114.	Man	2	4	6	550	450	Yes.	Yes.	1917
UB-117.	Vulcan	2	4	6	550	450	Yes.	Yes.	
UB-122.	Korting	2	4	6	530	450	Yes.	Yes.	

[1] Not known. [2] About 1,000. [3] Blohn-Voss.

Inspection of engines of surrendered German submarines at Harwich—Continued.

Boat.	Make of Engine.	Number in boat.	Cycle.	Number of cylinders.	Horsepower engine.	Revolutions per minute.	Air.		Year.
							Starting.	Reversing.	
UB–131.	Benz	2	4	6	530	450	Yes.	-----	1918
UB–149.	Korting	2	4	6	530	430	Yes.	-----	1918
UC–94	Man	2	4	6	300	450	Yes.	No.	
UC–98	Man	2	4	6	300	450	Yes.	No.	
UC–101	Man	2	4	6	300	450	Yes.	No.	1918
UC–103	Man	2	4	6	300	450	Yes.	No.	1918
UC–104	Man	2	4	6	300	450	Yes.	No.	1918
UC–105	Man	2	4	6	300	450	Yes.	No.	1918
U–A	Krupp	2	4	6	(1)	-----	Yes.	No.	1913

[1] Not known.

The above table shows the engine installation of 36 boats taken at random; of these five are equipped with two-cycle engines. The two-cycle engines inspected were all of the Germania Krupp type and similar, as far as could be seen, to the Krupp design before the war. The engines of the four-cycle type were manufactured in almost all cases by the MAN Co. The few other makes found so resembled the MAN type as to indicate their manufacture from the Man Ausburg design.

The prevalency of the MAN four-cycle engine proved beyond doubt the superiority of this type in Germany. For this reason that type only was examined in detail and furnishes the material for as much detailed information as it was possible to collect for this report. The inspection was concentrated on the engines of U–164, which are six-cylinder, four-cycle, air starting and reversing, 1,200 horsepower, at 450 revolutions per minute.

Sizes.

The MAN engine was found mainly in four sizes, namely:

300 horsepower at 450 revolutions per minute, ——— stroke, 10.937-inch bore.

550 horsepower at 450 revolutions per minute, ——— stroke, 12.792-inch bore.

1,200 horsepower at 450 revolutions per minute, 17-inch stroke, 17.750-inch bore.

1,750 horsepower at 380 revolutions per minute, 530-mm. stroke, 530-mm. bore.

The exceptions to the above four standard types are the 850-horsepower MAN four-cycle engine of an old model, 1912, and the charging engine on the submarine cruisers U–135 and U–141. These charging engines are the MAN Ausburg design, 450 horsepower at 400 revolutions per minute, air starting.

All the above types are made in six-cylinder units and are air starting; all but the 300-horsepower type are reversing.

Material.

A shortage of copper is noticeable in the construction of these engines or rather a progressive shortage for some of the earlier Krupp engines are made of bronze. Steel is used to a very large extent; the cylinder, heads, housings, bedplates, and piping, together with other parts which are found in general practice, are of this material. The bedplate and housing should be especially noted in this connection since it is rather a complicated casting with parts as thin as one-half inch or less. Engine parts were not painted, but apparently all unfinished castings were applied with an anticorrosive wash or iron filler paint.

Engine-Room Arrangement.

The general arrangement of the engines and auxiliaries is similar to our practice. The two engines are placed abreast and turn outboard going ahead. The attached lubricating pumps are driven from the vertical shaft at the after end of the engines. The attached circulating pumps are driven off the crank shaft at the forward end of the engines. The two auxiliary lubricating pumps are forward and outboard of the engines above the floor plates and are motor driven on horizontal shafts. The two auxiliary circulating water pumps are at the forward end of the engine room; the motors are above the floor plates and the pumps below, the shafts being vertical.

The control of the engine is at the forward, inboard side of each engine.

Spares and tools are stowed in metal lockers, built in, outboard of the engines, forward of the engines, under the floor plates, between the engines and in racks overhead and outboard on the hull.

Except in the boats larger than the 800-ton type the spares consist of small engine and auxiliary parts, such as valves, etc. Only on the large boats are cylinder heads or pistons found.

Tools, both standard and special, are neatly stowed in racks with a silhouette of each tool painted on the rack to insure proper stowage. Special tools are all numbered for the purpose intended.

Working room around the engines is limited, particularly abaft and outboard of the engines; however, the engines are generally accessible. Disassembling gear is provided overhead; athwartships tracks and chain falls; but apparently the engines are found to re-

quire little or no major overhaul at sea. The floor plates are pressed, bumped steel, are very strong and accurately fitted. They are secured to the angle irons by means of dogs operated by flush head bolts, slotted for a special wrench or large screw driver.

Cylinder Heads.

Cylinder heads are made of cast steel, machine finished outside. The top and bottom surfaces are practically flat and the horizontal section square with rounded corners. Adjacent heads are held together by means of steel tie plates.

There are six valve openings in the head. This arrangement is varied in the 300-horsepower engines on account of the single-spray valve.

Passages, open to the starting valves, are provided, fore and aft, through the inboard part of the head. These starting air passages are connected between cylinders by jumpers. The whole serves as a starting air manifold.

The arrangement of valve openings and cooling spaces is seen to be very symmetrical, allowing of equal expansion under running heat.

Castings are made in rights and lefts in order that adjacent heads may be placed with inlet or exhaust passages adjacent.

The cylinder-head joint is of the usual spigot type, with copper gasket similar to our practice.

Cylinder heads are secured by means of eight steel bolts, $2\frac{1}{8}$ inches in diameter.

The indicator cock connection is through the inboard side of the head.

Cylinders.

Engine cylinders are of cast steel with separate liners. The jacket and skirt which form the upper half of the housing are cast integrally. Webs and flanges are provided on the forward and after sides for bolting to adjacent cylinders and at the bottom for bolting to bedplate flange joints. These are metal to metal and the whole construction is very substantial and rigid. On the 300-horsepower engines the working cylinders are cast in pairs. Handholes are provided in the water jackets for cleaning. The cylinder liner is apparently made of close-grained cast iron. It is secured at the top where the head presses it against a shoulder in the cylinder casting; a stuffing box is provided at the bottom of the cylinder jacket to provide for lateral expansion of the liner and at the same time insure watertightness of the water space between jacket and liner. The stuffing box is secured by tap bolts wired.

Bedplate.

The bedplate is of channel construction, generally similar to our practice, except that the sides are carried up much higher. There is no separate housing provided; the skirts or lower parts of the cylinders and the high sides of the bedplate form this part. Abreast each main bearing, inboard and outboard, there is built up a girder construction connecting the bedplates and cylinders, which gives great vertical strength and athwartship rigidity. This construction, together with the bolted connection between cylinders at the top and the cylinder-head tie-plates, makes the whole engine extremely rigid and free from vibration when running. The bedplates for the 1,200-horsepower engines are made up in three sections with bolted metal-to-metal joints.

Pistons and Wrist Pins.

The working pistons are of the trunk type, and appeared to be made of fine close-grained cast iron. Each piston is provided with five rings at the top, the lower one being a wiper ring, and one wiper ring about 5 inches from the bottom. The piston head is dished, forming a combustion chamber. Piston rings are lap jointed, and are fitted with dowel pins to prevent rotation. Piston clearance on the 1,200-horsepower engines as taken with feelers was found to be roughly 0.016 inch at the bottom, and 0.062 inch at the top.

The wrist pin is of casehardened forged steel. It is straight, not tapered. The wrist pin is secured by two large bolts passing through the bosses and piston walls. The securing bolts are in turn secured by set screws.

Valves.

All principal valves are placed vertically in the cylinder heads. The inlet and exhaust are poppet valves of the usual type, the exhaust valve being water cooled (by a connection to the circulating water system). The inlet valves are of cast steel in one piece. The exhaust valve stems are of cast steel, on which are welded cast-iron heads. A cooling chamber is cored in the exhaust-valve head. Cooling water is forced in through a small tube in the stem and discharged out through the annular space around the supply tube. The lift of the inlet and exhaust valves is about 1.5 inches.

Air-starting valves and relief valves are very similar to our practice. The relief valves are provided with air plungers for positive lifting when reversing the engines.

The spray valves are provided in pairs to each cylinder, except on the 300-horsepower engine. The lift of the valve spindle is controlled to choke the spray air at low speeds. Each spray valve is provided with a nozzle plate drilled with six 2.4-millimeter holes. The internal

construction of the spray valve, the atomizer, etc., is according to general practice. One special feature is the actuating connection between rocker arm and the spray-valve spindles. One rocker arm, which is forked on the valve end and carries a tappet plate on trunnions, actuates both valve spindles. Instead of the usual practice of lifting the spindle by direct contact between the tappet and a fixed shoulder on the spindle, in this engine a strong spring is interposed.

The spray-valve cam begins to take on the roller about 30° before top firing center, but the valve itself does not open until about 8° to 10° before center.

Valve Gear.

The cam shaft is located on the inboard side of the engine at the level of the heads and is driven by worm and gear from a vertical shaft at the after end. The vertical shaft is driven by worm and gear from the crank shaft. The 2:1 gear ratio is obtained in the gears between the vertical shaft and cam shaft. The cam shaft turns inboard going ahead. The cams are solid and keyed on the shaft, except the spray cam, which is an adjustable insert on a carrier keyed to the shaft. Two cams are provided for each valve—one ahead and one reverse. The cam-shaft bearings are carried in supports which bolt rigidly to the flanges where the cylinders are joined together. The same supports also carry the bearings for the rocker shaft, which is located directly over the cylinders. The rocker shaft forms the pivot for all the valve rockers, or rather carries eccentric sleeves on which all the valve rockers pivot. The inlet and exhaust rockers are carried on fixed eccentric sleeves on the rocker shaft so that by turning the shaft the valve rockers are lifted. The spray and air starting rockers are carried on loose eccentric sleeves on the rocker shaft and are thrown in or out by means of the starting levers. All valve rocker arms are held with their tappets against their respective valve stems, the play always being at the roller end where the sloping surface of the cam will start the lifting motion without striking.

Crank Shaft.

The crank shaft is a hollow steel forging in one piece, including the air-compressor cranks. The main cranks are set at 120° angles, Nos. 1 and 6, Nos. 2 and 5, and Nos. 3 and 4 being at the same angle. The air-compressor cranks are at 180° and in phase with cranks Nos. 1 and 6. The sequence of cranks is 1, 4, 2, 6, 3, 5 for the starboard engine and 1, 5, 3, 6, 2, 4 for the port engine (No. 1 cylinder is considered forward). The crank shafts are apparently interchangeable. No thrust bearing appears to be fitted, but the end clearances of all crank webs is very small, probably to provide for that purpose. No balance weights are fitted to the crank webs.

Air Compressors.

Four stage air compressors are provided on all the types noted except the 300 horsepower, which has a three-stage compressor. The cylinders are made in twin castings and are tandem. Air-compressor cranks are set opposite. The lower pistons are double acting, the first stage being obtained on the upstroke in both cylinders, the second stage compression taking place in both cylinders on the down stroke. The lower pistons are of the trunk type, and second-stage compression is obtained in the annular space around the lower pistons. The third and fourth stage compressions are obtained in the two upper cylinders, respectively, single acting. Air discharge to coolers is screened, but not cooled. Air compressor valves are apparently very reliable and require little overhaul. Engine air compressors are used to charge starting bottles and ships air.

Fuel Pump.

The fuel pump is practically similar to the MAN design as built by the Nelesco Co.—refined in detail. The plungers are vertical and carried on two crossheads driven by opposed cranks on a jack shaft which is driven by worm and gear from the crank shaft. The plungers are free on their stems and can be rotated with the fingers. The suction valves are measuring valves and are controlled by the fuel-control hand wheel and governor. There is also provided cut-out control from the starting levers and by air from the conning tower. The discharge valves are automatic checks, two for each pump. Small hand-priming plungers are provided for each cylinder on the fuel pump. They serve to prime the fuel lines before starting. A fuel reservoir is provided in the pump lock fitted with needle float valve and vent cock.

The fuel pump block is provided with eight pump barrels, the two middle ones being for oil (lubricating) pressure to the spray air regulator.

The control of the fuel pump is shown by kinematic diagram.

Governor.

The governor is of the simple inertia type and is driven off the forward end of the crank shaft. The inertia weights are small and the whole apparatus compact. It is apparently an excess speed cut-off governor rather than a speed-control device.

Clutch.

The engine clutch is of the friction type and is air operated. The tail clutch is similar in design but is operated by hand through worm and gear.

The outer casing or female member of the clutch is carried on the engine shaft, serving also as a flywheel. It is made in two parts,

bolted together, and machined to cone surfaces inside, the cones being base to base.

The male part is carried on the motor shaft. The motor shaft carries a flange or spider on which are fixed four large pins parallel to the shaft axis and extending through the spider on either side. On these pins are carried two circular blocks, one forward and one abaft the spider. The blocks have a small axial freedom on the pins. The peripheral surfaces of the blocks are coned to conform to the inner surfaces of the flywheel. Forcing the blocks apart engages the male and female conical surfaces. Drawing them together releases the surfaces and disengages the clutch. The cone blocks are operated from a sliding sleeve on the motor shaft by a series of links and toggles. The forward link of the system is a heavy steel spring. The conical surfaces are cut with oil grooves. The sleeve on the motor shaft is operated by means of a strong back, fixed at one end and carried by the piston of an air cylinder at the other. Connection to the clutch sleeve is made by yoke and collar about midway of the strong back.

Auxiliary operating gear is provided in a small hand air pump and air bottle.

The working parts of the clutch are all finish machined and finely fitted and its action is extremely smooth.

Attention is invited to the compactness and small size of this clutch for the power transmitted—1,200 horsepower.

Exhaust and Muffler.

The exhaust header is made up in three sections of steel with welded seams and flanges. It is water-jacketed, with the usual jumpers around flanges. Exhaust from the cylinders is taken off by three elbows, each one serving two cylinders. The exhaust header is connected at its after end by a large water-jacketed pipe to the evaporator. From the after side of the evaporator another water-jacketed connection leads through the inboard exhaust valve to the elbow deck connection. At the after end of this elbow outboard is placed a large gate valve, and thence a long section of water-jacketed piping to the muffler. The muffler is a large cylindrical nonpressure expansion chamber. It is baffled by about six transverse plates with semicircular segments cut in their periphery. Segments in adjacent plates are staggered. The muffler is completely water-jacketed, but no water spray is put into the exhaust. The muffler is provided with a number of flapper vents, which are operated from inside the boat. A muffler drain is also provided with valve and reach rod into the motor room. Note that the entire exhaust system from the forward end of the exhaust header to the after end of the muffler is water cooled. The inboard exhaust valves are large water-jacketed globe valves,

with loose disks and auxiliary stems for grinding in without disassembly. These valves close against the sea pressure. The outboard exhaust valves are water-jacketed gate valves, situated outside the hull and operated from inboard by a system of reach rods. These are apparently meant to be quick closing.

Thrust Bearings.

Ball-bearing thrust bearings are installed on the line shafts. The installation is small and compact. The casing is made oil-tight, providing an oil bath for the bearing to run in.

Cam Shaft.

The cam shaft is a steel forging. It is carried in bearings whose pedestals are bolted to the intercylinder webs and flanges. The bearing structure is very rigid. The cam shaft rotates in the opposite direction from the crank shaft. It has an axial motion of about $1\frac{1}{2}$ inches. Two cams for each valve are keyed to the cam shaft—one for ahead and one for reverse. The axial motion of the cam shaft is obtained at the forward end by means of yoke and collar connection to the reversing gear. This motion is accommodated at the drive or after end by the shaft sliding in the drive gear wheel. Two diametrically opposite feathers of large size on the cam shaft, which fit in corresponding slots in the drive gear wheel, transmit the rotary motion.

Rocker Shaft.

The rocker shaft is a hollow steel forging which forms the pivots for all valve rocker arms. It is mounted in bearings carried by the same pedestals as the cam-shaft bearings. This shaft is made in sections for accessibility in lifting cylinder heads—six sections joined at the bearing supports.

The rocker shaft has a rotary motion of about 90° for lifting the inlet and exhaust rockers off their respective cams when sliding the cam shaft on reversal. These valve rockers are pivoted on fixed eccentrics on the rocker shaft.

Carried on free eccentrics on the rocker shaft are the valve rockers for the spray and air-starting valves. These eccentrics are operated by the two starting levers, one controlling the three forward cylinders, the other the three after cylinders. Rotation of these eccentrics throws in the spray or starting rockers as desired. The middle position of these eccentrics leaves both valve rockers off their cams to permit translation of the cam shaft.

Air Starting Control.

For purposes of starting on air the engine is divided into two groups of three cylinders each with a control lever for each group. Both groups or the after group alone may be used for starting.

The forward group only may be cut in on fuel while one group is on air. Actually operating the engines in the following practice was followed:

First step—both groups on air starting.

Second step—forward group on fuel.

Third step—after group on fuel.

These steps followed one another as fast as the starting levers could be operated, starting being accomplished in about four or five seconds.

The control lever for the after group: In the starting position—opens the relay of starting air valve, and also puts the eccentrics on the rocker shaft in the position where the starting-valve rockers are operative. It also operates the spray-spindle control to choke the spray air to the first group of cylinders; in the stop or mid-position—starting air valve is closed and the rocker shaft eccentrics are in mid-position with both spray and air-starting valve rockers clear of the cam shaft; in the running position—starting air valve is closed and the rocker-shaft eccentrics are in position to make the spray-valve rockers operative.

The control lever for the forward group: In the starting position, by means of a cam and small rocker shaft it holds down the fuel-measuring valves and cuts fuel off all cylinders. It also puts the rocker-shaft eccentrics in position where air-starting valve rockers are operative; in the stop or middle position it holds the rocker-shaft eccentrics in mid-position, so that both spray and starting-valve rockers are clear of the cam shaft; in the running position it sets the rocker-shaft eccentrics in position making the spray, valve rockers operative, and releases the fuel-measuring valves.

The starting levers are interlocked with the reverse gear so that they can not be operated when the reverse gear is in any intermediate position. Conversely, the reversing gear can not be operated when the starting levers are in any but the stop position.

Reversing Gear.

The reversing gear is operated by means of a handwheel on a fore and aft horizontal shaft at the forward end of the engine. By means of a worm and gear, vertical shaft, bevel gears, and link motion, the rocker shaft is rotated to lift the inlet and exhaust rockers clear of their cams. Next by means of a yoke and collar connection the cam shaft is moved axially about an inch and a half. The third and last stop is to roll the rocker shaft back in position so that the inlet and exhaust valves are operative. The above steps are obtained by turning the handwheel eight complete turns. A sliding collar on the handwheel shaft is moved forward by means of a cam and spindle through the shaft while the gear is in any but

final ahead or astern positions, and its function is by link connections to brake boxes to lift the cylinder relief valves during reversal.

Spray Spindle Control.

The lift of the spray-valve spindles is limited by a stop which is raised or lowered by means of a connection to the fuel-control handwheel. It operates to choke the spray air at low speeds and powers. Connection is also provided with the starting levers as explained above.

Fuel Control.

Control of the fuel-measuring valves is by means of interconnected links from the fuel handwheel and from the governor substantially the same as our practice. The control operates to hold open the fuel suction or measuring valves during any desired part of the pumping stroke of the plunger. A separate tappet plate is provided to hold the measuring valves completely open by link connection to the starting levers when they are in the "starting" or "stop" position. This tappet plate may also be operated by means of a small air plunger which is controlled by air connection from the conning tower.

Auxiliaries.

The attached oil pump is a multiple impeller pump which operates very quietly. The arrangement of holes in the idle gear and channels in its spindle appear to aid materially in the operation of the pump. It is believed they are arranged to relieve excess pressures where the gears mesh. The pump valves are arranged to accommodate running in either direction. This pump operates at the same revolutions per minute as the engines, being driven off the vertical shaft. The auxiliary oil pumps, two in number, are of similar type driven by separate motors.

The attached circulating water pumps are two-cylinder, single-acting, plunger pumps, driven by opposed cranks on a jack shaft driven by worm and gear from the crank shaft. On the four types of boats inspected these pumps were disconnected. The auxiliary circulating water pumps, two in number, are of centrifugal type driven by separate motors on vertical shafts.

Fuel Compensation.

No fuel-supply pumps are installed; the fuel is displaced in the tanks by circulating water and forced to the gravity tanks. Compensation is automatic.

Coolers.

Both air and oil coolers are of the straight-tube type, installed with tubes vertical. There are duplicate oil coolers, and coolers for each stage of the engine air compressor. The air coolers on each engine are placed in a single shell, air entering at the top to the respective

nests of tubes and passing out through separators at the bottom. Cooling water enters at the sides of coolers and passes across the tubes. It was not ascertained whether or not the water spaces were baffled.

Evaporator and Distiller.

An evaporator or heater is installed in the exhaust line abaft each engine. It is of the straight-tube type, tubes being placed horizontal and athwartships. Exhaust gases pass across the tubes. Evaporator feed is taken from the circulating-water system. When not making water, the circulating water is passed through the evaporator coils with vapor pipe secured. The evaporator may be used as a heater for ship's heating and to provide hot water for shower bath. One straight-tube distiller is provided for the two evaporators. It has a separate motor-driven pump for cooling water.

Strainers and Filters.

Strainers are of the basket type, similar to our practice. Filters are provided with muslin bags.

Instruments.

A striking feature of the MAN engine is the permanent equipment of instruments provided. The engines are designed scientifically and installed to be operated scientifically. Besides the usual equipment of gauges, thermometers are installed to give the temperature of practically every working and vital part of the engine.

A direct reading electric salinometer is installed to give instantaneous measurement of the chlorine content of evaporated water.

An electric apparatus for detecting salt water in the fuel supply is installed.

A differential pressure gauge is installed to indicate the oil pressure to and from the filter. This shows when the filter is restricted and needs cleaning.

Lubricating System.

Sump tanks are installed, located one under the center of each engine. Suction from the sump is taken to either or both attached or separately driven oil pumps. From the pump the oil is delivered through a twin filter to the cooler. From the cooler the oil is divided between the lubricating and piston cooling systems. The lubricating oil is lead to its pressure regulator and from the pressure regulator to a supply manifold pipe located on the inboard side of the crank case. Branches from the supply pipe are taken to each main bearing and to each cylinder. Oil from the main bearings is carried on to the crank-pin bearings from which overflow or leakage drips into the crank case. The lead to the main cylinder delivers

oil which is picked up by the lower working piston ring which is fitted as a wiper. It is believed that this oil is delivered to the wrist pin.

The gear set at the forward end of the engine is lubricated by connections to the discharge pipe from the pressure regulator.

The gear set at the after end of the engine is lubricated by connections from the after end of the supply manifold pipe.

The rocker shaft is hollow and has a connection to the supply pipe which lubricates its bearings, the rocker bearings, roller bearings, rolls, and cam-shaft bearings. The cam shaft runs in an oil trough which is provided with drains to the return piston-cooling pipe.

The air-compressor cylinders are lubricated by means of a four-plunger lubricator driven from the countershaft.

Two drains are provided from the crank case to the sump tank, one located at each end of the crank case.

The lubricating oil found is very heavy. Sample has been sent to the Bureau of Steam Engineering for test.

Piston-Cooling System.

As noted above, the piston-cooling oil is branched off the oil discharge from the cooler, the bulk of the oil being taken by this branch. The lead is taken to a supply manifold pipe located along the inboard side of the crank case. Branches are taken off at each cylinder through the housing to the pistons and from the pistons; return pipes lead to a sight drain box on the inboard side of the engine over the sump tank. The supply and return connections to the pistons are made up with knuckle joints, very similar to the installation on the U. S. S. *Fulton*.

Thermometers are fitted on the return oil leads to the sight drain box.

A by-pass between the oil-pump discharge and the crank-case drain passes through the piston-cooling oil regulator and serves to regulate the pressure in the cooling system by regulating the effective output of the pump.

Circulating Water System.

The circulating water system conforms to general practice.

Spray Air System.

The spray air system, air starting, and ship's air are interconnected and so used in German practice. The four stage air compressors deliver air to the tanks at any required pressures up to about 2,500 pounds per square inch. The spray flask also takes the compressor discharge pressure. From the spray flask a lead is taken to the spray air pressure reducer and regulator and thence to the spray valves. Reliefs are fitted on the spray air lines. The spray

air pressure is controlled statically by a spring-loaded reducer, in conjunction with which is an oil-pressure plunger which serves automatically to raise the spray air pressure as the engine speeds up. Pressure for the regulator plunger is obtained from a two-plunger pump in the fuel-pump block. Lubricating oil is used for a pressure medium.

Fuel System.

Fuel is supplied to the gravity tanks under the pressure of the circulating water system, circulating water being used to displace the fuel oil and thereby also compensate for the weight of fuel used.

The fuel found is very light, about the consistency of kerosene, and smells like kerosene. Sample has been sent to the Bureau of Steam Engineering for test.

Indicator Gear.

Indicator gear is provided for taking power cards. The indicator cock connection is attached to the inboard side of each cylinder head. The stroke motion is obtained from the piston cooling return link motion by means of a small spindle which passes up through an oil-tight sleeve in the housing.

Air-compressor cylinders are also provided for taking cards.

Workmanship.

The workmanship on the engines is uniformly excellent. The material itself is uniformly fine in structure and shows utmost skill in manufacture. All working parts are machine finished and accurately fitted. The engines are apparently designed in every detail to produce a finished product, each detail contributing to the final result. No makeshift jobs or evidences of afterthought were visible, as is often the case in less scientific machines.

Practically all nuts on the engine are wrench tight on their bolts or studs the full length of the thread, and all are secured by means of pins, wires, or locking washers. Handwheels on high-pressure air lines are large and fitted with a quarter to a half turn of lost motion on their stems to give a slight striking force for opening or closing. Pipe flanges which require frequent disassembly are made up with portable fastenings. The flanges are slotted in place of drilled bolt holes and the bolts are hinged under the lower flange.

Air bottles are of steel, two spray flasks and two starting bottles being supplied for two 1,200-horsepower engines. The combined capacity of the starting bottles is about 35 cubic feet.

Due to rigid construction and fine balance, the engines operate with extremely little vibration and are comparatively quiet. The engine-room air is free of smoke and gases and the exhaust is perfectly clear and well muffled.

U–135.

The largest engine installation observed was on the *U–135*. This vessel is one of the latest German Submarine Cruiser type. Lack of opportunity prevented a detailed inspection, but in general the installation is as follows:

The main engine installation consists of two MAN air-starting, 4-cycle engines, 1,750 horsepower each at 380 revolutions per minute. The engine and engine-room arrangements are in all respects very similar to the 1,200-horsepower engine described in this report. The main engines are not used for charging. Friction clutches are installed between engine and motor. The main engine working cylinders are 530 millimeters in diameter, and the stroke of the engine is 530 millimeters. The engines in operation are very quiet and smooth running. The pistons are oil cooled in the same manner as described in the body of this report. The construction of the piston is different from the smaller type of engines of the same design, the piston head being separate and is thought to be made of a special steel composition. Accurate information on this point could not be obtained. Forward of the main engine room and forward of the central operating compartment is the battery-charging room. The installation consists of two MAN Ausburg, 4-cycle engines of 450 horsepower at 400 revolutions per minute. These engines are air starting. The engines are placed side by side in the usual manner, with electric generators at the forward end, the operating end of the engines being aft. In addition to charging the batteries, these engines can be employed at high speed in conjunction with the main engines by means of electric drive. The vessel is thus capable of developing 2,200 shaft horsepower on each side.

U–141.

A general inspection of the sub. cruiser *U–141* showed a generally similar installation as described above for the *U–135*, the principal difference being that the charging plant on the *U–141* consisted of only one engine and generator. This charging station is below the central operating compartment. The charging engine is the type as found on the *U–135;* i. e., MAN Ausburg 4-cycle engine, 450 horsepower at 400 revolutions per minute.

U–139.

The installation on the sub. cruiser *U–139* consists of two Germania Krupp engines, 6-cylinder, 2-cycle, 1,600-horsepower at 350 revolutions per minute.

The bedplate and housing are steel construction, the housing of the box type. The cylinder jackets are bronze; cylinder liners appar-

ently cast iron, with stuffing box at lower end of jacket. Piston is apparently close-grain cast iron. Cylinder heads are bronze.

The engines are air starting and reversing. There are six working cylinders, with a combined scavenger pump and air compressor at the forward end of each engine. A separate scavenger receiver runs back of the engine below the exhaust line. The pistons are fresh-water ccoled, the cooling system being the U-shaped telescopic piping similar to the design on the Nelseco Co. 1,000-horsepower, 4-cycle engine.

The vessel is apparently designed for a charging room similar to the *U–141*, but neither charging engine or generator are installed, the space being used as a storeroom.

INTERNATIONAL CONDITIONS.

MILITARY SITUATION IN GERMANY AND SOVIET RUSSIA.

Source: Military Intelligence Division.

16 May 1919.

(1403A)

GERMANY.

PRESENT AND READILY AVAILABLE ARMED STRENGTH.

On November 11, 1918, the total strength of the German forces was 4,500,000 men. Since that time nearly all troops up to and including the Class of 1898 have been demobilized. The Classes of 1899 and 1900 have been officially demobilized, but a large proportion of them have reenlisted in the volunteer forces, as is the case with the classes from 1900 on. The excuse for the repeated calls for volunteers for the "New Army" is to protect the eastern frontier from the Poles and to check the advance of the Russian Bolshevists. Because of the increased pay in the Army and the difficulty of securing lucrative employment elsewhere, large numbers of discharged soldiers have voluntarily returned to the colors. Then, too, the Army gets almost the only decent food in Germany, and this has proved a great inducement to reenlistment. The most reliable information indicates that the present German Army consists of between 400,000 and 600,000 of the best soldiers in Germany, well equipped and organized. It is further estimated that there are available supplies for an Army of a million men.

In addition to the troops already organized, there are bodies of discharged officers and men and civilians who are loyal to Field Marshal von Hindenburg and who are awaiting the proper moment to declare themselves. Arms and ammunition have been secretly issued to these men. In the Magdeburg district alone they are reliably reported to number 12,000.

DISTRIBUTION.

The organized forces, with the exception of von der Goltz's army in the Baltic Provinces, is within the borders of Germany. The total force under von der Goltz is estimated at 50,000, and of these

not more than 6,000 are pure Germans. Estimates of the strength of the German forces opposed to the Poles vary from 100,000 to 175,000. These troops are divided into the North Army, under Gen. von Quast, and the South Army, under Gen. von der Borne. The General Staff Headquarters of operations in the East is located at Kolberg and the advanced headquarters for Polish operations is at Kolmar. There are troop concentrations around Berlin and in the vicinity of Dantzig. Government troops are also stationed in various parts of the country for the purpose of preserving internal order.

CASUALTIES.

The final casualty lists for the war have not yet been issued by the Government. The latest figures (which may, however, be somewhat exaggerated) are as follows:

Dead	1,580,000
Wounded	4,000,000
Missing	260,000
Prisoners	618,000

MORALE.

All men of revolutionary tendencies or who are hostile to the present Government have been weeded out of the Army. As fast as new suspects are noted, they are promptly demobilized on one pretext or another. Hindenburg is again the moving force behind military affairs and he is extremely careful to have no undesirable elements in his so-called "New Army." Reliable reports state that the discipline of the troops is good, and considering that they are a defeated Army, the morale of the troops is remarkable. Hindenburg is the rallying point of the mass of the people, while Ludendorff exerts a great influence among the Junkers and Imperialists. But as Ludendorff seems to be wholly under Hindenburg's domination, this gives the Field Marshal the whip hand in German affairs. The Army is thoroughly loyal to him and apparently could be relied upon in an emergency.

SENTIMENT.

Up to the middle of February the German people were too overwhelmed by the events of the revolution to pay much attention to the significance of the military surrender to the Entente Nations—the possibility of having to make reparation or to pay indemnities. As far as they concerned themselves with the outside world, the majority of them felt that they had waged a war of defense and that they were the aggrieved and injured party, much put upon by their rulers and by the Entente Powers. Gradually, however, the people awoke to what the Peace Conference really meant for them. From that moment the great goal for all patriotic Germans was the amelioration of the peace terms. As their Army grew and became more

stabilized the people grew more assertive in their demands for leniency and repeatedly warned the Allied Council "not to force Germany too far."

The spread of Bolshevism was another factor which they hoped would induce the Allies to reduce their demands. There is still little evidence of any feeling of wrong doing on the part of the German people. Having overturned their former Government, they feel that they have made reparation for the war, and expect the Allies to accept it as such. They have placed their entire faith in President Wilson's 14 points and are relying on the United States to secure for them the "abstract justice" which they feel they would not get from the other Allied Powers.

SOVIET RUSSIA.

PRESENT AND READILY AVAILABLE ESTIMATED STRENGTH.

The Bolshevist forces on all fronts consist of about 400,000 men, of which 25,000 are experienced troops. Besides this force there are about 100,000 formed in the interior and about 250,000 in the process of forming. This gives the total Bolshevist forces as 750,000 men, but only the forces that are actually on the fronts should be considered, as those troops in the interior are only partially formed and equipped.

DISTRIBUTION.

The Bolshevist system of organization provides for detached divisions. The forces on the various fronts are distributed as follows:

The Sixth Army, composed of about 32,000 men, occupies the northern front.

The army engaged in the Esthonian front numbers about 32,000 men. This army contains 32 regiments of infantry, 6 regiments of cavalry, some artillery, and transport troops.

On the southwestern or Polish front there are about 34,000 troops.

In South Russia there are about 160,000 troops, covering the front from the southwest of Kiev to the Caspian Sea. Parts of the Southern Army are well disciplined by Russian officers of the old régime.

On the Ural front there are about 130,000 troops.

In Trans-Caspia and Central Asia there are about 12,000.

MOBILIZATION.

The first plan of mobilizing included only volunteers. This was found unsatisfactory. A form of elective draft was then resorted to, which included only laborers and former soldiers. As this did not yield sufficient numbers for the Bolshevist increasing need, attempts have been made for more general mobilization, which includes the Bourgeoisie. Prisoners report that most of the new Bolshevist re-

cruits are brought from the interior in a starving condition and prefer any kind of military service to starvation.

FORTIFICATIONS.

The Bolshevist régime is not believed to have added to the coast defenses that Russia built under the Monarchy. Aside from the old-fashioned system of defense at Moscow and Petrograd, Russia has always relied upon her difficult terrain and great distance to repel invasion. The Baltic Fleet, which has been in the harbor at Petrograd, has been dismantled to a great degree, the guns being used for artillery on the various fronts.

ORGANIZATION.

The Division, which is the largest tactical unit used by the Bolshevists, is composed of—

A.—Divisional Infantry.

The Division consists of Three Brigades.

Composition of the Brigade:

(*a*) 1 officer of the General Staff for military operations.
1 liaison officer.
1 chief of detachment.
9 troopers.
(*b*) 2 to 5 infantry regiments.

Composition of the Regiment:

(*a*) 1 regimental staff.
(*b*) 3 battalions.
(*c*) 9 special detachments.
1. Machine guns (12 machine guns on wheels).
2. Bomb throwers and gunners.
3. Liaison:
25 telephone apparatus.
4 telephone centrals.
8 control apparatus.
75 versts of wire.
2 motor cycles.
12 bicycles.
4. Scouts (25 horsemen).
5. Sappers (35).
6. Regimental School.
7. Medical Service (4 doctors).
8. Administration and special workers (52 men).
9. Band.

Composition of the Battalion:

(*a*) Staff.
(*b*) 3 companies.
(*c*) 1 machine-gun detachment (6 machine guns on pack).

Composition of the Company:

(*a*) 3 platoons.
(*b*) 1 detachment of machine gunners with 2 machine guns and pack animals, or 4 automatic rifles.

Strength of the Company:

5 officers.
12 noncoms.
144 riflemen.
10 grenadiers.
9 scouts.
26 machine gunners.
6 cooks and teamsters.
14 Medical Corps men and stretcher bearers.

Total: 221 Soldiers.

B.—Divisional Cavalry.

One Cavalry Regiment.

Composition of the Cavalry Regiment.

(*a*) Staff.
(*b*) 4 squadrons.
(*c*) 4 special detachments.
1. Machine gunners (4 machine guns with pack animals).
2. Liaison (6 stations, 36 versts of wire, 5 motorcycles).
3. Regimental school.
4. Administration.

Strength of the Squadron.

6 officers.
12 noncoms.
120 sabers.
23 clerks.

155 rank and file.

C.—Divisional Artillery.

1. One group of heavy artillery, consisting of two batteries—one of six guns and one of four guns. Each battery has a detachment of infantry, a section of anti-aircraft guns, and two machine-gun detachments.

2. One brigade of light artillery, consisting of three groups of three batteries each with four guns to a battery.

D.—Divisional Engineers.

One battalion of engineers:

(*a*) Three companies, sappers.
(*b*) One railroad company.
(*c*) One company bridge builders.
(*d*) One section armored automobiles.

The theoretical strength of a single division reaches in round figures:

25,000 infantry,
5,000 cavalry,
2,000 artillery,

which, with the different services, makes a general strength of about 35,000 men. This figure is far from the real one, as even if a few divisions exceed 10,000 men in number, others are very irregularly formed and are scarcely more than one or two thousand men.

CONDITION OF THE DIFFERENT BRANCHES.

Infantry.

The most variable regimental composition, going from 100 to 2,600 men. The infantry is armed with the Russian rifle, model 1891. The reserves are armed with Berdan rifles. The number of rifles allows the arming of 475,000 men.

Cavalry.

The most rudimentary organization exists. The regiment may contain a few horsemen and about 300 to 400 horses. Each army possesses, however, a few hundred horsemen able to be used as scouts or liaison personnel. The greater part of the cavalry is used on the southern front. In the interior, the old regiments have been replaced by Bolshevik regiments of a few hundred men led by former noncoms. The number of horses is insufficient and they are badly cared for.

Artillery.

The weak point of the Soviet Army is its lack of artillery. In the southern front there is an average of three light batteries per

division. The Fifth Army, against the Czecho-Slovaks, had in October only 36 field guns, 9 heavy cannon. In the Ninth Army there are 100 cannon, unequally distributed. On the other hand, the Tenth Army is said to have 200 cannon. The material is in bad shape; many fuses miss fire; there is a lack of manganese; pyroxiline is available in sufficient quantities.

TRAINING.

The officers of the army are taken from four sources:

(*a*) Commissioned officers of the old Russian régime.

(*b*) Noncommissioned officers of the old Russian régime.

(*c*) Officers from foreign armies.

(*d*) Student graduates from the military school. The military schools are open to soldiers from the front and to all persons over 16 years of age; infantry officers are usually commissioned after three months and cavalry after six. The artillery school has two courses—one of four months and one of seven. These schools are located at both Petrograd and Moscow. The students are considered as the most reliable troops that the government has and they are held in readiness to put down riots and quell mutinies and other disorders of this kind.

The only training of the enlisted men and noncommissioned officers of the Soviet Army takes place while the detached divisions are in the process of formation.

EQUIPMENT AND SUPPLY.

The Soviet Government has always secured sufficient quantities of food for the army. The fact that food supplies were available for the army when the civilian populace was sometimes almost starving has been the means of securing a great many recruits.

The munitions factories in Petrograd and Moscow have been at work for several months, but the work is so bad that the total output of shells from three of these factories is only about from 200 to 300 a day. Fires and explosions occur and machines are often intentionally damaged by emery powder being sprinkled in the bearings.

The total number of rifles is about 475,000.

The artillery equipment can hardly exceed 2.000 guns and, due to the conditions in the munition factories, shells are often lacking for these. Armored cars and armored trains are fairly plentiful, but are usually under the control of the sections operating them. The transport service in general is poor.

MORALE.

The present system of electing officers has a tendency to weaken the morale of the Soivet forces. Officers seeking favor from their men often side with them in mutinies. Desertions sometimes amount to as much as 30 per cent of the strength.

Two considerations that enormously increase the power of the Soivet Army are:

(1) The widespread conviction in its ranks that it is fighting for an idea which will level up the masses, a doctrine which is adroitly used by its leaders to evoke patriotism and a certain amount of real loyalty to the common cause.

(2) The obvious fact that it is fighting on its own soil against foreigners, or against Russians in receipt of foreign aid, is a nationalistic idea which has likewise been made most of by its professed internationalist leaders.

RECONSTRUCTION OF THE GERMAN FOREIGN SERVICE.

Source: Reliable.

(10869)

The following article is an intercepted German document.

In the past the relations between the German foreign office with the foreign trade on the one side and the people of the various countries with whom there were trade relations, in spite of many successes there were undoubtedly many errors to which in a large measure the surprising enmity of half the world can be attributed. Allies fell away and became enemies; people whose neutrality one thought assured joined the war as our enemy; diplomatic blunders and lack of foresight of our foreign office endangered our relations with the South American Republics.

The men who have spent their lives in foreign trade, lived in foreign lands, learned their people, methods of dealing, and how their trade is carried on and protected are best qualified to point out our (Germany's) mistakes and suggest improvements.

The causes for the success of foreign trade may be summarized:

1. Proper selection of leaders.
2. Thorough knowledge.
3. Well-founded principles.
4. The conviction of the constant need of improvement.
5. Organization.
6. Determination, thoroughness, and industry.

A consideration of these and practical suggestions for the renewal of our foreign service are made by the hundreds of members of the foreign trade with advice from statesmen, diplomats, officials, and scholars.

The right leader depends upon a narrow selection from the available list followed by a constant competition, so that no one is assured his place and must yield it as soon as he falls behind. This must be a fight without pity or favor.

Thorough knowledge is the tool of trade. Besides schooling, a protracted and not superficial study in foreign lands is required. A thorough mastery of languages is needed which should be included in preliminary training. This is also the time in which to get rid of many habits required at home and which would prove a handicap in dealing with other peoples. Nearly every German youth has greater theoretic knowledge than the youth of other nations in similar circumstances. He therefore gets conceited, wishes to impose his ideas everywhere, speaks with authority, and gets on everyone's nerves. Also certain military and student poses, unnoticed by us, are irritating to foreigners. It is these little peculiarities that have largely made us unpopular abroad. Then he must specialize—learn the field in which he is to work, produce something of value, and when he returns to his country to take up representative duties he leaves a trained worker behind to continue his efforts on whom he can count.

Principles in commerce are based on utility. Foreign trade must satisfy the outside world and so follow their wishes and desires. Sentimentality is only useful in talk, never in deed. Credit and recognition in foreign lands should be our aim. Economy in the wrong place is unwise. Friendly relations with the inhabitants and a recognition of their good qualities should be cultivated.

Our constant striving after new and better methods permitted us to overhaul England's trade while she sat still, convinced of her superiority.

If the proper man is at the head, he will create a proper organization on personal lines. A chief should never do work which a subordinate can do. In filling places only usefulness should be considered; the employees are there not for personal interest but for the undertaking. Services must be well paid. Sufficient personnel is essential with thorough cooperation. Foreign trade requires full, private, and prompt information. Success in this can be only had by expenditure of effort and money. In this connection accurate credit information is of great importance.

The following are the main causes for the failure of our foreign office:

1. Lack of suitable people.
2. Improper preparation and insufficient knowledge.
3. Wrong principles and methods.
4. Inadequate organization.
5. Lack of sufficient funds.

Those who lead our foreign policy and the representatives abroad must be the best the Nation possesses. Our representatives were too often the representatives of dynastic interests. The sovereign was the fixed point around which all turned.

Now the diplomat must be the representative of the people. They must not feel social distinctions or caste, but be prepared to enter the arena of the people; not bearers of Kultur, but fighters for the good of the Nation. The field from which these men can be picked must be enlarged. It must not be limited to men of large fortunes.

The best place for preparation and study for this source is in the big trade cities, especially Hamburg, for there is a chance there to study the peoples and commerce of the world. Study should be less theoretic and more practical than heretofore. As special study and knowledge are desirable, a protracted service in any particular land is advisable. The past method of changing attachés of the foreign office from country to country to give them a wider range of experience has proved erroneous. An exact knowledge of the language is most important; no real knowledge of land or people is possible without it.

The sympathy of the world, which, during the war, turned to our enemies, though in large part due to envy and fomented by the enemy press, was, in a measure, the result of our foreign policy, which failed to win a measure of confidence. This resulted from our foreign office substituting their own psychology for that of the people with whom they were dealing, and proceeded on theories instead of true conditions. German policy of seeking to avoid conflict was interpreted as weakness. The world does not understand working for ideals, but believes in self-interest, and if this is not followed one is credited with deceit and hidden motives. England was much better understood, because she always worked for practical results. Also she used the press to explain and prepare her activities. For our policies to succeed the official work should be accompanied by propaganda in the foreign press.

The foreign office was insufficiently manned; and after the war the task and therefore the need for men will be much greater. To be mentioned is also the lack of proper codes and ciphers and means of secret communications as shown by the amount of the secret correspondence of most important matters which fell into the hands of our enemies and were used by them to our disadvantage.

It is necessary that we have as large means at the disposal of our foreign office and representatives as any other nation. Good service must be well paid. Money is also needed for the foreign press. We erred in relying upon our good consciences. Now we shall have to combat the lies spread against us during the four years of war.

The difficulties of rebuilding foreign trade against the hatred which has been aroused, with the property that has been lost and the organizations that have been created to combat it, are evident. Still it is a prime necessity for the future of Germany, and we do not despair of success. But a new and reorganized foreign service is a

prerequisite, and unless the merchants have the assurances of a proper understanding of its needs on the part of the state and finds protection from it its future is doomed. Time is precious, the work must be started now.

Suggestions.

1. *Proper Policy of our Foreign Diplomacy.*

Our leaders must deal in the name of a world power and conduct themselves authoritatively. It is useless to dissemble that the policy is the expression of the will of a nation's power. Only the interests of Germany should be considered not what is theoretically thought to be the correct or cheapest. The Germans in foreign lands must be protected in person and in interests. Kid-glove policies make no impressions. Gratitude is unknown in politics. We must stand prepared for battle. The foreign press must be used through furnished information, its purchase, and the creation of new organs. Propaganda through schools, missions, and churches of all denominations, moving pictures, and other means should be used to spread our culture and combat the idea of our being barbarians. Confidence at home can only be secured by a systematic use of the home press.

2. *The Foreign Diplomatic Service.*

A central controlling agency should unite the Diplomatic and Consular services and Trade Institutions. The questions of commerce should never be behind the questions of state relations for consideration.

3. *Diplomacy and Consulships.*

A.—Necessary Hypothesis for our Diplomats.

Diplomacy is an art, and most careful selection and training is needed to get the right men. The practice of favoring the nobility for such places has worked great prejudices and should be abolished to make the choice on fitness only. Also a personal fortune should not be required. The position should be well paid. On the other hand, it should be required that this money be disbursed and not saved. A pension system should render this unnecessary.

B.—Preparation of our Diplomatic Consuls.

Foreign trade is the main objective of world politics. So this must be a large factor in the preparation of our agents. Also the career should follow progressive steps by promotions. Special study of the lands and peoples in which the service runs is necessary, and it follows that this should be continuous, so that a group of countries should be elected by an official and his activities confined therein. This knowledge must include politics, history, and cul-

tural elements, added to this, of course, a thorough language training, and finally a judicial governmental knowledge to handle technical questions.

The countries for service groups might be divided as follows:

I. GERMANIC.

1. Austria-Hungary, Switzerland.
2. Holland, Scandinavia.

II. ANGLO-SAXON.

1. Great Britain and its colonies.

III. LATIN.

1. France and Italy.
2. Spain and Portugal.
3. Middle and South America.

IV. RUSSIA.

V. NEAR ORIENT.

1. Balkans.
2. Turkey and Asia Minor.
3. North Africa.

VI. MIDDLE AND EAST ASIATIC.

1. Middle Asia.
2. China.
3. Japan.

VII. AUSTRALIA AND SOUTH SEA.

Suggestions are made for the prescribed courses of study to be taken in preparation for foreign service—beginning at the 19th year; includes at 22 a year military service either in the navy or in one of the colonies. At 23, a year of practical work in the home office, or a board of trade at 24. Two years of special work in the group to be elected, and if possible practical experience with some large export and import house. Then a year's service in the foreign office and a half year's residence in a consular office abroad.

He would then be placed on the eligible list for a position as vice consul or attaché in his group. A board should consider all appointments, especially from the viewpoint of character and fitness. Every candidate must be thoroughly nationalistic in his attitude. Anglicized or internationalists are not fit to represent the German nation.

C.—Organization and Activity of Our Diplomacy.

If big men are to be secured for the service, they must be given independence of action. Heretofore all questions had to be referred to the central office. He should, however, give uncolored and expert

reports. An influential position demands imposing appearances; thus, nationally owned buildings in all principal cities, a large and carefully chosen body of assistants and subalterns. Their loyalty must be beyond question. Best possible systems of communications, ciphers and codes. An information service for the foreign press, and the cultivation of intimacy with press representatives are matters for which sufficient bank credits must be supplied. The German representative should travel throughout the land and make as wide acquaintance as possible and be in close touch with the large German commercial houses. They should forward the national spirit amongst all Germans, even those who have given up their German residence, to have them remain aids to German culture and trade.

D.—Organization and Activities of Our Consulates.

Consuls should be sufficiently well paid to attract good men and enable them to make a proper showing. They should give frequent reports, like the American Commerce Reports, to help trade. And these, again, should be collected into periodical summaries on important topics. In larger places the consul should establish chambers of commerce and call together meetings of representatives of German houses. They should establish collections of books and industrial and trade conditions in the countries where they are located. Consuls should not be only in foreign ports, but placed in the interior of the countries.

In the past German capital did not venture into large and lucrative foreign developments because the Government refused to support, because of possible entanglements. The Government should take this responsibility and seek it where the matter is financially sound, and enlist its foreign officials to further such enterprises. This requires German protection against foreign courts and laws, which should be undertaken by the consular agents with government backing. Such services can only be performed by professional consuls. Where such is not warranted it is better to select a German representative than intrust German interests to another power. A marriage outside of the German people should at once end the consular career.

4. The Commercial Section of the Foreign Office.

The reports of consuls and trade experts go to the commercial political section of the foreign office. Here all information is correlated, worked up, and given proper publicity. It should have at its disposition experts and keep in touch with all German commercial interests and opportunities.

5. The Information Section of the Foreign Office.

The duty of this is to spread information about Germany and German products throughout the commercial world. Especially through influencing the foreign press, it can influence opinion favorably toward acts of the German government. It should also see that the domestic press is properly informed to aid in advantageous political moves.

Success depends largely upon good telegraphic connections. To this end the net of cables should be developed and wireless communications established, the state finding further and better means for this than heretofore. The foreign office must have a first class telegraph bureau. If the Wolff bureau is to remain the government agency, it must take over the Havas and Reuter systems.

Organizations in every foreign country for the receipt of German information and their dissemination must see that news with a recognized mark gets into the press—both the pro-German and the indifferent—and into the German papers, which should use Latin print to facilitate their reading. The influencing of the at present hostile press can only be secured by an especially powerful organization. This is the most important task of this section.

Not only telegrams, but ready-to-publish articles must be sent broadcast, made up in the foreign languages, with illustrations which are particularly effective with the Latin races. Moving-picture films and clever German and foreign lecturers should be used. It must be remembered the governments of other lands are not as important as the popular opinion.

The purpose is not only to smooth Germany's political aspirations and strengthen her trade but also to offer an attractive picture of German culture so that the people get a personal sympathy for us and see not only the soldier, tradesmen, or school teacher.

GERMAN NAVY.

Source: Reliable.

15 May 1919.

(8713)

CHIEF OF THE ADMIRALTY.

The German Government has decreed as follows:

The navy shall be under the control of the Ministry of Defense and directed by the Chief of the Admiralty. He shall have a seat in the cabinet, but no vote. All matters of command and administration of the navy shall be under his control. Rear Admiral von Trotha has been appointed Chief of the Admiralty. By Imperial Government decree there has been placed under the control of the newly created Chief of the Admiralty all marine authorities which

previously were under the personal control of the Emperor, the Ministry of the Imperial Marine, the Admiralty Staff, and the Station Commandants in all executive and administrative affairs of the central nations.

APPROPRIATIONS.

26 May 1919.

(11286)

On March 28 the German Parliament discussed the naval appropriations. According to the declarations of the Government the navy will have the provisional duties of the destruction of mines, protection of fisheries, and assisting the merchant marine by drawing up charts, nautical papers, etc. The navy personnel, recruited as far as possible by voluntary enlistment, will be divided into three brigades, one of which will be stationed at Berlin. It will be impossible to form a greater number of units, for a large number of young men who are still wearing the uniform are unfit for any real training and will have to be demobilized as rapidly as possible.

Speakers of the various parties supported the propositions of the Government by bearing on the fact that this plan is only provisional and that they by no means have the intention of renouncing in the future on a navy of a certain importance. Only the Independent Socialists made any opposition, above all regretting that, considering their method of recruiting and organization, these forces resemble a "body of police" directed against them. In his answer, Noske pointed out that the German Navy could be a menace for nobody, the "iron fist" at sea at present belonging exclusively to England and America. He promised to do everything possible not to infringe on the rights acquired by the navy-yard laborers, as also the interests of the towns of Wilhelmshaven, Kiel, and Danzig. To conclude, he announced that he had obtained satisfactory promises regarding the collaboration of leading men in Austria.

The appropriations were voted at first and second reading against the votes of the Independent Socialists.

Source: Reliable.

1919.

CHINESE CONDITIONS.

(11403A)

Strength.

Present strength:

Northern forces	648,500
Southern forces	304,000
Total	952,500

(These figures are estimates.)

Future strength:

Dependent on the organization of a stable centralized government for all China.

Organization.

China has an efficient plan of organization, but the Chinese Army is so demoralized that it can not now be considered as an organized or competent fighting force. Both northern and southern forces are made up of independent armies, each acknowledging only the command of the immediate leader. Officers as well as personnel are untrained and inefficient. If the leader is friendly to the government, his army is called a Government or Northern Army; if unfriendly, a Revolutionist or Southern Army.

Distribution.

China proper:	Northern forces.	Southern forces.
Northern and northeastern provinces	416,000	
Central provinces	149,000	162,000
Southern and southeastern provinces		142,000
Manchuria and Siberia	83,500	

The small detachment of troops in Siberia is cooperating with the Allies in guarding the Amur Railway north of Vladivostok.

Efficiency.

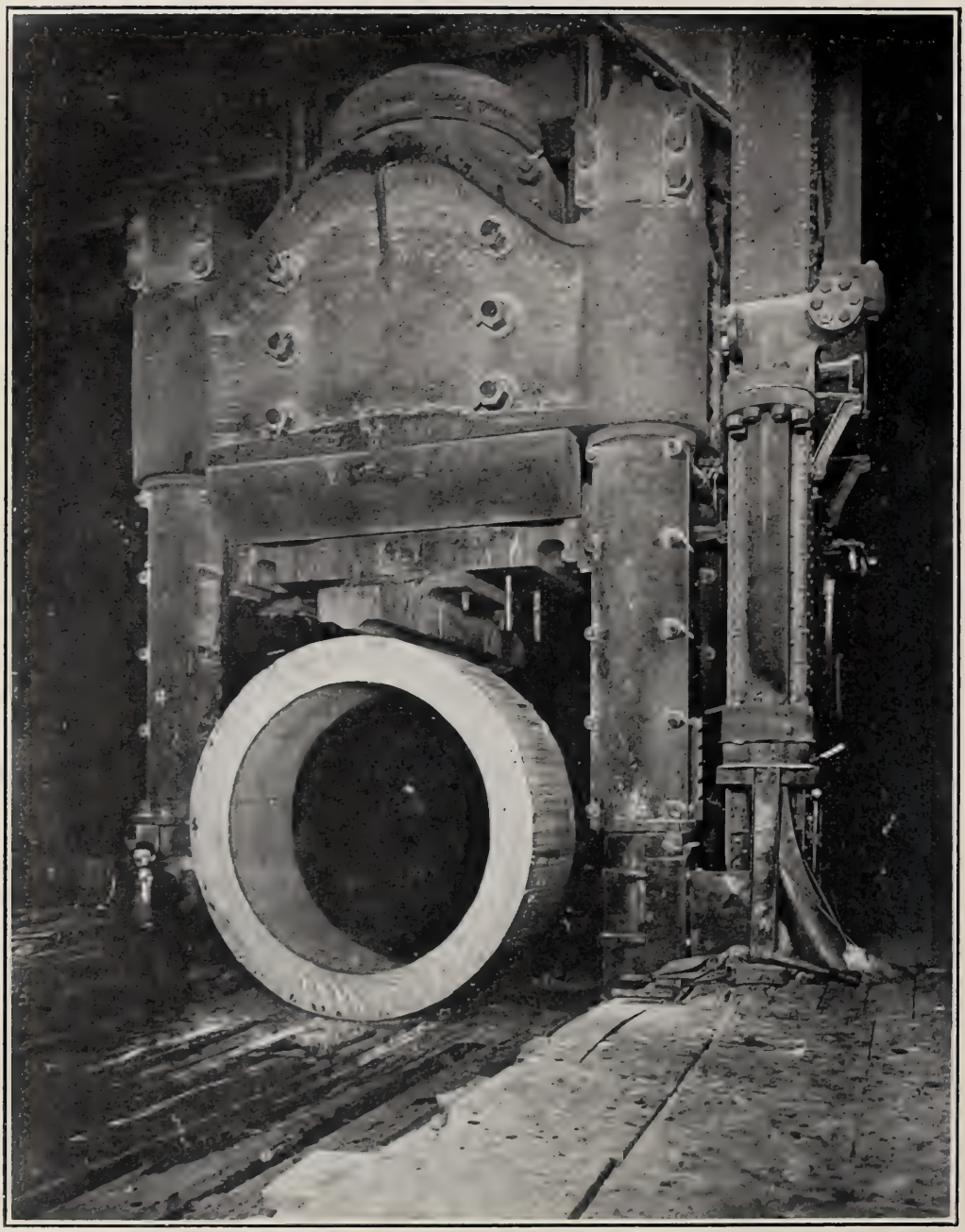
With the majority of the leaders there is no proper discipline; troops are easily swayed and frequently transfer their allegiance; commanders are apt to be mercenary. However, such leaders as Chang Tso Lin in Fengtien and Li Shun in Kiangsu maintain organization and discipline among their troops. Both of these men received part of their military training under Yuan Shih-Kai, and the troops of both are from the divisions of the former Regular Chinese Army.

Equipment.

In the main material is old, equipment poor, and methods out of date. A few of the provincial leaders have small amounts of modern equipment.

General.

China will not have an organized army until a central government is established which will gain ascendency over the chaotic civil conditions and, more specifically, control or do away with the militaristic provincial governors.



LARGE BILLET EXPANDED AT 10,000-TON PRESS.

ORDNANCE.

A MAGNETIC METHOD FOR TESTING PROJECTILES.

Source: Reliable.

October 1918.

When Italy entered the war and it became necessary to enlist the services of all sorts of small as well as large shops in making shells, the resulting diversity of heat treatment made it desirable to put every shell through a hardness test, instead of only a few samples from each large lot, procedure which had been sufficient when the shells were all made by firms with large experience in the production of shells. A quick method was therefore needed for testing the shells in the roughed-out state before sending them to the final machining.

The following apparatus, the operation of which is very similar to the Hughes induction balance, is based on the well-known fact that in a given kind of steel the mechanical hardness and the magnetic permeability are simply related, so that a test of the permeability may be used to give an indication of the mechanical properties.

Since the relation between permeability and hardness varies with the composition of the steel, this method can not be relied upon if the steels are of markedly different composition.

It has been found in practice that this apparatus may be used to examine round steel bars received from the steel mills. The bars are thus sorted out into lots, each of which is approximately uniform, and it becomes possible to distribute the steel to the shell factories so that each shop has a uniform raw material to work on. The result is not only that the product of each shop is more uniform but also that the magnetic method may then safely be applied in inspecting the product, which would not be the case if the raw material were not approximately uniform.

The practical value of such a method can, of course, be determined only by trial. That the method is valuable under the conditions prevailing in Italy seems to be demonstrated by the following facts:

1. It is in use by 20 private Italian shell factories.

2. It is in use by the military authorities at Naples, Genoa, Milan, and Turin for sorting out shipments of steel bars, and two sets of the apparatus have been ordered for the Spezia Navy Yards.

As regards shell testing, it may be noted that at the Turin works of the "Societa Italiana Fabbricazione di Proietti" twelve thousand 75-millimeter shells were tested in a 20-hour day, using two sets of apparatus. This is at the rate of 12 seconds per shell, so that the method must be regarded as quick. It has been used mainly on 75-millimeter shells, but also to some extent on other sizes up to 149-millimeters.

A further use which has been suggested for the apparatus is in detecting faults or the substitution of inferior materials in the middle of lengths of steel wire rope, the rope being run continuously through the testing coil.

Let us suppose that we have a lot of projectiles all prepared from a given type of steel; that is, of determined chemical composition, but differently treated. Let us examine a certain number of these projectiles for the magnetic viewpoint. We may easily regroup them into a certain number of groups, each of which will be made up of projectiles practically identical from the magnetic point of view.

Let us subject a certain number of projectiles of each group to a test of resistance to traction. It will be easily established that all the projectiles of a given group present about the same resistance and that those belonging to different groups present perceptibly different resistances; the greater their resistance the weaker their magnetic permeability is to be seen.

The correspondence has been found experimentally by us to be constant. We have also found leisure to convince ourselves that certain small variations in the chemical composition, although superior to those which are habitually tolerated in industrial analyses and in the control of the materials usually furnished by steel dealers, have an influence sufficiently small, and do not lessen the practical result.

We now select two projectiles respectively from those of the groups which in the mechanical tests have shown the maximum and minimum admissible resistance.

The projectiles to be accepted, all having resistances comprised between these which are attributed to the two sample projectiles, should also reveal magnetic permeabilities intermediate between those of the two samples.

Now, in order to determine whether this condition is verified, it is very evident that it is not required to know the numerical value of the permeability; that is, it is unnecessary to make an absolute determination. A comparative measurement effected in a very simple manner is sufficient, if the pieces under examination have all the same form and the same dimensions.

Let, then, m and n be two pieces of steel, geometrically identical, between the magnetic properties of which we desire to make a com-



14-INCH ARMOR-PIERCING PROJECTILE AFTER PENETRATING 13½-INCH CLASS A ARMOR PLATE.

82-1



FORGINGS FOR 14-INCH AND 16-INCH RIFLES.

82–2

parison; these are placed inside of two coils, each composed of two distinct windings, a primary and a secondary.

The two primary (coils), identical with respect to each other, are connected in series with an electromotive force, an amperemeter, and a rheostat. By closing the switch these are traversed by a current the intensity of which may be regulated at will, and the direction reversed by making a half turn of the reverser.

At every reversal the magnetic flux in the pieces of steel m and n is reversed, and there is consequently generated an electromotive force in the two secondary windings S and S′. These secondary windings, identical with respect to each other, are in their turn connected in series with a ballistic galvanometer. The connections are, however, made in such a manner that the two electromotive forces are always opposite.

It follows that if the two pieces of steel are also magnetically identical the two magnetic fields generated by the two primaries turn out to be equal, and consequently, also, the two electromotive forces, which at every reversal originate in the two secondaries. These, however, mutually compensate each other. Now if in m the permeability is greater than that of the other, n, one of the electromotive forces will exceed the other; with the switch closed, the secondary circuit will be traversed by a certain quantity of electricity, and the ballistic galvanometer will receive a certain impulse.

And since the reverser mentioned above, besides reversing the current in the two primary windings, also causes the reversal of the connections of the galvanometer in the secondary circuit, the deflections are always produced in the same sense, both when the magnetizing current passes from a certain value $+ i$ to the value $- i$ and when it passes from $- i$ to $+ i$.

Deflections in the opposite direction would take place if the piece of steel m had a magnetic permeability less than that of the piece n.

If we desire to render the results of the measures independent of the possible difference of the two coils, it is convenient to keep one of the pieces of steel fixed in one coil, using it simply as a tare, and introduce the various pieces to be compared successively into the other coil.

If it is desired to take one of these pieces as a standard and refer to it all the others, it is convenient for this purpose to reduce the deflection of the galvanometer to zero. This can easily be done by manipulating the resistance which functions as a *shunt* to the secondary coil.

We have already said that, in the case of projectiles, the purpose of the measurement is to ascertain if their magnetic permeability is or is not included between two selected limits. It is fitting, therefore, to manipulate the resistance in such a manner that for the

limits determined by the two standards the deflections are equal and of contrary sign. The magnitude of these deflections can then be adjusted at will by means of another resistance which *shunts* at the same time both the secondaries. One may almost say that a given central region of the scale comprises the zone of acceptance. The projectiles which cause passing beyond either limit of this zone will then be considered as too hard or too soft; the former should be annealed, the latter tempered.

MEASURING VELOCITY OF SHELLS—FRENCH.

Source: Reliable.

May 1919.

The most precise method which is used is that of the Boullenger chronograph. Some modifications have been made to the older types, so that it is now considered a very accurate instrument. An accuracy greater than $\frac{1}{10}$ per cent is claimed for this instrument. The Schultz chronograph is also used to some extent. A less accurate method is by the use of the bow wave. For this they generally use the Joly chronograph; an accuracy of 1 part in 800 is claimed for this method.

The apparatus has been developed for measuring velocity by means of observing the shell in a moving mirror. The moving part is carefully balanced, so that the center of gravity is in the axis of rotation. It is actuated by a spring. Hence the motion of the mirror is independent of the position in which the system is held. The shell is observed by means of a telescope of short focal length. The velocity of the mirror is continually increasing, and the apparent velocity of the shell in changing, since its distance from the apparatus is continually changing. The observation consists in noticing the position of the mirror when the shell and the mirror have the same velocity; that is, when the image of the shell appears to be at rest. When the image appears to be at rest, it will be located at a certain part of the field of view of the telescope. In the eyepiece of the telescope there is a scale. The location of the shell at the moment when it appears to be still is read on the scale of the telescope. If a second shell is fired from the gun, all things remaining the same, the position of the shell at the time when it appears to be still in the eyepiece of the telescope will be the same. If the velocity is different it will be displaced by a certain amount; from this amount of displacement the difference in velocity can be determined.



FORGING A GUN JACKET.



BARBETTE ARMOR.

APPAREIL ROUGE.

Source: Reliable.

May 1919.

The above apparatus is called the apparatus Rouge. It has been developed for the rapid comparison of shots from a single gun, especially when firing at high angle.

First models of the apparatus have been entirely experimental. At the present time a number are being constructed; when completed one will be furnished to the United States Army. It is expected that they will be ready about June 15, 1919.

The second matter discussed is a question of pressure. Very little new work has been done on the measurement of pressure during the war. Crusher gauges are used almost exclusively.

Question of determining the velocity and acceleration of the shell from the velocity of recoil was discussed at length. No new theoretical formulas have been developed. French consider that the waves of pressure in the gun are such that it is impossible to make any rational determination. They have been principally interested in the measurement of recoil in order that they may compute the stresses in the gun carriages.

There was also some discussion of the determination of the pressure in the gun chamber from the measurement in the acceleration of recoil.

EFFECT OF SHELL BURSTING ON AMMUNITION DUMPS.

Source: Reliable.

1 May 1917.

Shell Fire.

A question has several times been raised as to what are the effects of German projectiles of various calibers when they burst in the immediate vicinity of ammunition in a dump, in the open air, or under light cover.

Without discussing the question completely, the Secret German Instructions, No. 1019, dated 9th August, 1914—"Wirkung der Fussartillerigeschosee"—gives some information, as it describes in a special appendix—"Wirkung gegen Munition"—the effect which shells up to 21-centimeter caliber have. Shells of larger caliber than this not belonging to the German Foot Artillery.

A literal translation of this instruction is given below.

As this document treats separately, under distinct headings, the case of "Langgranaten" and that of "Sprenggranaten," it is necessary to define exactly these two different kinds of shell.

The following is the definition given in the "Handbuch der Waffenlehre," by Maj. Berlin, Edition 1912, p. 414:

"Langgranate" or "Long Shell" means any shell charged with high explosives, of at least 3½ calibers in length. These shells have comparatively thin sides, so as to have a greater capacity, and are always fired with percussion fuses.

"Sprenggranate" or "Common Shell" means shell charged with high explosive, of less than 3½ calibers in length.

These shells have comparatively thick walls, so as to break up into a larger number of pieces. They are always fired with a T. & P. fuse, so that, if necessary, they can be fired by time in order to destroy any object behind cover.

So many changes have taken place since the commencement of the war that these definitions have practically lost their rigor; so that new long shells are employed by field artillery with T. & P. fuses, while the 1914 shell, which really are "Sprenggranate," are nevertheless provided only with percussion fuses.

[Translation of Appendix I to the Secret German Instructions No. 1019, dated 9th August, 1914.]

I. "Long Shell" (Langgranaten).

All long shell will detonate if high explosive shell of caliber above 77 millimeters expode in immediate contact with them.

Detonation may also occur if high explosive shell detonate at a short distance from a shell of less caliber which is fused. This distance varies with the force of the detonation (depending on the size and caliber of the exploded shell). The distance is as much as 40 centimeters (say, 1 foot) if the exploding shell is a 15-centimeter shell (5.9) and to 1 meter (39 inches) if it is a 21-centimeter shell (8¼ inches).

The detonation is propagated to all the shell which are in contact with one another—in a wagon, in a dump, or in an ammunition store—if the shell explodes in contact with one of them.

It is not propagated if they are separated by an interval of, say—

0.50 meters (18 inches) if the exploding projectile is 15 centimeters,

and 1.20 meters (say, 4 feet) if the exploding projectile is 21 centimeters,

or where there is an earth traverse between them—

0.30 meters (1 foot) in the first case and 0.60 meters (2 feet) in the second.

The provision of an earth blindage supported on beams suffices to protect to a certain extent piles of long shell. The minimum thickness of the blindage should be 0.75 meters (1 foot 6 inches) against shell of medium caliber without delay-action fuses. If they are fired with delay-action fuses, or are of larger caliber, a greater thickness is necessary.

Shell exploding in these blindages may scatter shell lying in them and seriously injure them.

Shrapnel shell, or other shell whose fuses miss fire, break up long shell where they strike them and reduce their bursting charge to powder.

The bursting of shrapnel shell sometimes sets fire to this powder, and this in turn lights neighboring fuses in shell which are spread about on the ground. The fire may thus be spread to boxes of shell and after a time, if the temperature becomes high enough, it may cause long shell which are within the radius of the conflagration to detonate. A similar conflagration may be started by the impact of shell against boxes containing ammunition.



3-GUN TURRET PORT PLATE, PARTLY MACHINED.



ERECTING A LINE OF SIDE ARMOR.

II. Common Shell and Shrapnel.

(*a*) Common shell of 15 centimeters and shrapnel of all calibers.

Among these shell only those will detonate which are actually struck by long or common shell detonating in immediate contact with them.

The propagation of the detonation from one common shell to another, or of the explosion of one shrapnel to another, occurs occasionally, and the more readily in that the walls of these shell are especially thin. These shell are generally considerably damaged by explosion in their vicinity.

The time fuses of common shell and shrapnel are not lighted when the projectile detonates in their immediate neighborhood.

(*b*) Common shell, 21 centimeters.

These do not detonate when they are hit by a shell of small caliber; they are only broken open.

The danger of detonation through conflagration is the same as in the case of the long shell mentioned above.

III. Propellants.

Pure nitrocellulose or nitrocellulose mixed with glycerin, made up in packets, would be detonated by the explosion of a field artillery shell in immediate contact.

Cartridges of nitrocellulose or nitrocellulose with nitroglycerin, placed in boxes, will explode if a long 15 centimeter bursts at a distance of from 2 to 6 meters away from them.

In the case of a long 21-centimeter shell, this critical distance is from 4 to 12 meters.

Explosions take place under the same conditions if the charges are contained in metallic cartridge cases.

As to cartridges of W. P. or Rg. P., when buried in boxes,[1] the powder simply burns when a long 15-centimeter shell explodes less than a meter away from them.

Cartridges are undamaged if the distance is $1\frac{1}{2}$ meters.

The doors usually placed in front of niches for ammunition are not sufficient to prevent the detonation being transmitted to cartridges which are in the niches. Their effect is only to diminish, more or less, according to circumstances, the critical distance mentioned above.

Considerable quantities of smokeless powder may detonate without causing the detonation of cases of powder in the neighborhood if there is an earth traverse of not less than 1 meter in thickness between them.

Cartridges placed in cases are as a rule burst so that the powder runs out of them; the cases themselves are broken open.

In case of fire, the smokeless powder burns quietly, without detonation or explosion.

IV. Fixed Ammunition for Guns.

The conditions are the same as those given in cases I, II, and III, but are still less favorable as both cartridges and shells are present together.

V. Mechanisms Designed to Explode Shells.

(Fuses, Detonators, Etc.)

From the point of view of facility of propagation of detonation, these devices are comparable with powder in tubes. If they contain caps with fulminate of

[1] W. P.—Wurfelpulver (powder in cubes); employed particularly with howitzers and mortars.

Rg. P.—Ringpulver (powder in rings); employed in coast-defense howitzers.

mercury, they may detonate when a shell charged with high explosive detonates near them. If these caps detonate, two cases must be considered:

(1)[1] If the fuse is "Rohrsicher"; that is to say, such that the "conditions of being armed can not be produced either in the bore of the gun or within a short distance of the muzzle" the shell carrying it will not be detonated, by the fuse at all events.

If the shell is subsequently fired, it will not be exploded on impact since its percussion caps have already gone off. The firing of it would not endanger the gun's crew, nor would it injure the shell itself.

(2) If the fuse is not "Rohrsicher," the shell will explode.

During a fire the mechanism which contains fulminate of mercury will detonate; those which do not contain it will explode.

Fuses which have been injured by explosions of a certain magnitude will give rise to blinds, or the delay action, if they have one, may be put out of order.

The risk of detonation with fulminate of mercury caps and of injury to the fuse by explosion of the shell may be diminished by protecting them with blindage made of planks or sandbags.

A fuse which is "Rohrsicher" does not get to the "armed condition" till the shell is no longer in the immediate neighborhood of the gun. Until this moment all the percussion caps may go off without the explosion being transmitted to the bursting charge. Hence the frequent reference to the fuse being "without danger of a premature explosion in the bore," especially in the tables concerning the use of German ammunition. (C. R. No. 24, of 1 November, 1916, and C. R. No. 33, of 1 January, 1917.)

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[1] This definition is literally translated from the German: "Zunder, die so eingerichtet sind, dass ein Scharfwerden im Geschutzrohr oder nahe vor der Mundung ausgeschlossen ist, neunt man rohrsicher." (Sondervorschriften fur die Fussartillerie, D. Geschosszundungen. p. 6.)

MISCELLANEOUS.

BRITISH "K" CLASS SUBMARINES.

Source: Reliable.

28 June 1919.

General:

Displacement, surface, 1,880 tons.
Displacement, submerged, 2,650 tons.
Length, extreme, 339 feet.
Beam, extreme, 26 feet 6 inches.
Draft, 16 feet.
Speed, surface, 24 knots.
Speed, submerged, 9 knots.
Horsepower, surface, 10,000 at 24 knots.
Horsepower, submerged, 1,400 at 9 knots.
Fuel-oil capacity, 170 tons.
Radius, submerged, 70 miles.
Built under emergency war program.
Armament: Two 4.7-inch or 4-inch guns; one 3-inch high-angle fire gun; six 18-inch torpedo tubes.

Hull and Operation.

Double hull. Space between inner and outer hulls is divided into tanks for stowage of fresh water (including boiler water) and fuel oil, and for ballast tanks. Due to the fact that the ordinary flooding of ballast tanks required too long, due to lack of pressure, scoops are fitted abaft the kingston openings.

Height of superstructure above deck is 7 feet. Height of stacks above superstructure is 6 feet. Main hull is about 4 feet above water.

The pilot house is flooded upon submerging, and is only spray tight for surface running.

The high bow serves to break the force of the sea against the pilot house.

Two large hatches, one forward and one aft, are for battery ventilation when charging in smooth water and for removal of machinery.

The conning tower, closed from the pilot house by a water-tight door, contains a steering wheel in the central operating compartment located below the conning tower. It also contains an ordinary compass and a gyro repeater.

From the time of the signal "Prepare to dive" to time of diving two minutes is allowed. In this time the boilers are pumped up and the oil secured; also the stacks are secured from the inside of the hull. The stacks are hinged and by operating an electric motor are dropped back into the wells, this operation automatically closing the stack opening hatches. The stack hatches are in a special air duct, preventing their becoming overheated and warped. The construction of this duct is not known.

The hydroplanes are run out electrically from inside.

To take the boat under from the signal "Prepare to dive" takes approximately five minutes.

Tanks are blown or are pumped with electrically driven triplex plunger pumps. There are about 100 air flasks, at 2,600 pounds per square inch air pressure, located at various points in the boat.

The stern diving rudders are operated by the Janney system, which is similar to our Waterbury tool gear.

A 10-foot rowing tender, with detachable motor, stows in the superstructure.

Boilers.

Two small Yarrow, capable of delivering 5,800 M. P. each. Seven burners operated from manifold with a master valve.

Boiler room is under pressure of from 6 to 8 inches, air being supplied by a turbine-driven blower taking suction from under superstructure. Water sometimes enters here, compelling the firemen to wear oilskins. After oil is shut off and boilers pumped up temperature in firerooms rises from 140° to 160°.

One evaporator; not sufficient to supply all feed water required.

Engines and Auxiliaries.

Two Parsons turbines for ahead and one for astern.

Turbines are 4-stop horsepower and 4-stop lifting power, operating at 300 pounds pressure at 2,000 revolutions per minute. Reduction gears (herringbone) reduce shaft speed to 400 revolutions per minute. Shaft is fitted with clutch.

Dynamo and Batteries.

Carburetor is Diesel-engine driven. Engine has eight cylinders.

This engine is independent of main shafting.

The generator is used for charging and for running the main motors after a long submerged run when the batteries are low and when steam has not been generated. The oil used is of finer quality than that used in the boilers.

Batteries are lead acid, delivering about 250 volts. Constructed in three independent sets, each set in a separate water-tight compartment. Each set consists of 112 cells. All cells are made of

"gummite," a patented substance manufactured in France. This substance is also used for lining battery tanks.

Motors and Electrical Equipment.

Two motors connected to main shafts through gearing and clutch for disconnecting when operating under steam.

Connected to run in series for slowest speed and parallel for medium speed. Control is electric from central operating compartment.

Auxiliary motors are semi-inclosed and not satisfactory, due to the moisture.

Sperry gyro compass has six repeaters.

The switchboards are built up on angle-iron frames and switches, and instruments are secured to crossbars covered with pressed mica.

This is a more expensive construction, but more rugged and accessible.

Periscopes.

Two Lord Kelvin housing type, 30 feet long, operated by oil piston. Can be used to altitude of 70°. Cross wires on eyepiece. Calcium chloride drier used.

Torpedo Tubes.

Four in the bow; four broadside, side loading. Broadside tubes have been successfully fired when making 24 knots on surface.

Central Operating Compartment.

Gear located in this compartment: Kingstons, water manifold, diving rudder control, hydroplane control, air manifold and ballast tank vents, main and auxiliary motor controls, battery instruments and controls, torpedo firing keys, signal light apparatus, diving and trim gauges, master gyro, gyro repeaters, engine room telegraph and voice tubes, and steering wheel.

Radio.

A small room shaft central operating compartment contains a 5-kilowatt motor generator radio set. Sending radius, 500 miles. Masts are telescopic type in three sections 25 feet above deck; housing flush with superstructure. Masts are operated hydraulically.

Wardroom.

Located forward of central operating compartment. Will accommodate five officers. Captain's cabin is on starboard side. Electric stoves used for heating. Forward of wardroom, located one on each side of the ship, are two small rooms with a passage between. Each room contains two bunks, lockers, and dressers.

Ventilation.

The ventilation of the various compartments, going from forward aft, is as follows:

1. *Forward Torpedo.*—This has a 4-inch exhaust trunk with a small 3-inch exhaust branch for an adjacent water-closet. The only supply at present is from the contiguous apartments, but in future installations it is proposed to provide a supply trunk and fan leading from the 6-inch supply ventilator in the forecastle. A more direct lead for the exhaust trunk for this compartment will also be arranged. At present it has a sharp turn.

2. *Officers' Quarters.*—Two-thirds of this space is over the battery tank, which is covered with wooden covers with rubber gaskets, and presumably air-tight. This compartment has a 6-inch exhaust from the forward compartments, a number of inlet louvers being provided in the trunk. From this compartment forward also lead two 12 by 6 inch supply openings to the battery tank, and two 9½-inch exhausts from the battery tank located at the after end, discharging by ventilator in the after end of the conning tower.

In the after end of this compartment opens a 6-inch natural supply duct from a ventilator located on the forecastle, and there is also a torpedo hatch over it. The exhaust ventilation forward of this is by two 10-inch fans, located in the after end of this compartment, which pass the air on aft to the exhaust system in the central operating compartment.

3. *Central Operating Compartment.*—This compartment is transversed by a 10 by 7 inch exhaust trunk taking air from forward battery tank and forward compartments.

As this companionway is under the conning tower, nautral ventilation by means of a hatch is provided. In the after end of this compartment are located two 10-inch exhaust fans and a circulator for ventilating the wireless telegraphy room.

4. *Torpedo Room and Crew Space.*—This has a 6-inch exhaust which passes forward, forming a junction with the exhaust system of compartments forward of this point. These exhaust systems empty through the after end of the roof of the conning tower by two 11 by 7 inch openings.

5. *Boiler Room.*—This compartment is ventilated by the two 45-inch turbo (steam) driven fans for assisted and force draft. They take their air supply through openings located in the superstructure. When submergence is to occur the burners are closed, the fans speeded up, and the intakes in the superstructure closed by heavy bronze covers and the boiler room vacated and closed. Branches from this system extend to the engine room, but they are now closed off, as it was found that they delivered heated air only. The temperature of the boiler room underway is about 145° F.

6. *Engine Room.*—This is ventilated by two 17½-inch and two 12½-inch exhaust fans which discharge through openings located in the after end of the superstructure. Over the engine-room space is a 6-inch natural supply duct with a ventilator opening near the after end of the superstructure and two hatches; but the bulk of the supply comes from forward along the passageway on the starboard side abreast the boiler room.

7. *Motor and Oil Engine Room.*—This space has a 10-inch and a 6-inch natural supply and a 10-inch outlet, the ventilators for which are located just aft of the superstructure. They are patent French ventilators of the water-excluding type. The 6-inch natural supply ventilator is also connected up with a 10-inch supply fan. This compartment also contains a 10-inch exhaust system operating by a 12-inch exhaust fan. The 6-inch supply system continues aft through the after bulkhead of this compartment to furnish air to a crew space. A 3-inch exhaust for water-closet in the after end of this compartment is provided. With the Deisel engines running, the movement of air is said to be very active.

8. *Crew Space.*—This has a 4-inch exhaust with duct in its extreme after end, increasing in size to a 6-inch duct in its forward end, where it has several louvers. All the exhaust systems of the after end of the ship open by a 10-inch outlet on deck through a French ventilator.

All living compartments in the ship are provided with stationary electric fans of the transversing type.

It was noted that most of the rotary fans that were in operation during the inspection produced an abnormal amount of noise, thought to be due to lack of proper adjustment.

The ship had not been supplied with air purifiers.

There are three water-closets in the submarine of the Shanks type, and they are operated as follows:

1. Water is run in to cover the upper flap valve of the pan.

2. After using the flap valve is lifted and the contents deposited into the receiving chamber.

3. The flap valve is closed over the receiving chamber, making certain that it is closed tightly.

4. Compressed air is turned on into the receiving chamber below the top flap valve.

5. The lower valve of the receiving chamber is opened and discharge overboard occurs.

All ventilating trunks as they pass bulkheads are furnished with sluice valves. The air inlets to the 12 by 6 inch supply to battery tanks are fitted with water-tight covers, which should be closed when the vessel is submerged.

The general exhaust passing through the control room is fitted with movable sleeve, which allows of disconnection before submergence and of a certain amount of ventilation by continuing the fan even after the vessel is submerged for a short time.

The exhaust openings over the boiler room mentioned above, which are closed by heavy bronze covers upon submergence, were the openings referred to in a previous report on an accident to a "K" boat upon submergence. This accident was due to the failure to close one of these openings.

FINANCIAL SITUATION OF EUROPEAN GOVERNMENTS.

Source: Reliable.

(11415)

1919.

The following article is published not as an authoritative statement, but to show in general the financial situation of certain European governments.

Are the European Belligerents Bankrupt?

In view of the heavy demands now being made by the various countries of Europe for additional loans for reconstruction purposes, a brief statement of their present financial situation may prove of value. Owing to the secrecy which was thrown around all financial operations during the war, however, it has been found impossible to obtain accurate or full data on a great many points. Ordinary budgetary procedure in presenting estimates and voting appropriations for military purposes was for the time being entirely set aside, and the usual constitutional checks and safeguards were suspended. Appropriations were made in block, by votes of credit, and the distribution of these sums among different items of expenditure was left to the determination of the executive. Moreover, no reports of these expenditures in detail has been made.

The civil budget, on the other hand, has been regularly presented and voted in most of the countries, as Great Britain, France (except for 1915, 1916, and 1917), Russia (until 1918), Italy, Germany, Austria-Hungary (except for 1915, 1916, and 1917). But the figures presented in these budgets are not comparable with the prewar budgets, nor are they of service in estimating the needs of the future, for all military and naval outlay was from the beginning of the war transferred from the civil to the war account. Consequently the so-called "civil budgets" which were voted during the war shrank materially below those of the prewar period, except for the item of interest on debt, which grew rapidly. With the disappearance of separate military budgets, the civil budgets may be expected to show great expansion from now on, swollen as they are with enormous interest charges, pensions, increased salaries, and other

expenses of administration heightened as a result of the higher level of prices.

Similarly, the statistics of revenue are apt to be misleading, as they have been greatly increased by the addition of special war taxes, many of which are temporary in their nature, and are certain to be repealed as soon as practicable, such as the luxury tax and the war-profits tax. There is, moreover, a great difference among the various countries in respect to the extent to which they have developed taxation during the war. Some countries, like Great Britain and Italy, have levied upon the taxable ability of their people almost to the extent of their capacity. Other countries, like France, Germany, and Austria-Hungary, financed the war almost exclusively by credit and have added little to the tax burdens of their citizens. It is impossible to say, therefore, from a purely statistical presentation of their revenues how much reserve power still remains in each different country.

Almost the only thoroughly comparable and reliable figures are those relating to the debt charges, which in every country shows a startling and rapid rise to almost unbearable heights. In spite of the cessation of hostilities the expenditures of the Governments continue to be enormous, owing to demobilization, cancellation of contracts, and other similar items born of the war. These, however, are temporary in their nature, and will in a comparatively short time come to an end. Of more significance are the permanent additions to the peace budgets, and of these by far the most important is the item of interest on the public debt.

In the following survey an attempt will be made to estimate the amount of civil budget, of the interest on the debt, and of the revenue available to meet these charges. Such a statement shows in startling fashion the utterly bankrupt condition of most of the European belligerents. At least, their position is such as would lead in the case of any private or corporate business to an immediate declaration of bankruptcy and petition for the appointment of a receiver. In every case their expenditures are greater than their receipts, but as they are sovereign States the analogy breaks down at this point. A sovereign State may repudiate its debts at will without any legal redress on the part of the holder of its bonds, or it may postpone or scale down the interest charges. Ordinarily there are no tangible assets behind a government debt, and if there were they could not be seized to satisfy the claim of a creditor.

But the main point which differentiates a public debt from a private debt is the fact that behind the former lies the whole patrimony of the nation—its wealth, productivity, energy, and thrift. It is this which distinguishes the different countries sharply from

each other, for some of them have a large reserve strength and will undoubtedly be able to meet their obligations, while others have probably reached the limit of their ability, or possibly even exceeded it. Any estimate of the ability of the different nations to meet their debts must take these invisible factors into account. Of these the most important are the extent of the undeveloped resources of a country and the degree of industrial intelligence possessed by its population. The United States has both in large measure; the working people of Great Britain, France, and Germany are intelligent and well trained, but there are few undeveloped resources in any of these countries; Russia has vast natural wealth, but her population possesses a low grade of industrial intelligence; while Italy and Austria-Hungary have neither of these elements of industrial progress. In estimating the ability of the various nations to meet their obligations these factors of economic strength must be taken into account. With these preliminary remarks the actual situation in the leading European countries may now be analyzed.

Great Britain.

The financial situation in Great Britain before the war was a sound one. The budget practically balances, showing slight surplus revenues each year. Expenditures had been growing steadily, especially for purposes of social reform, but they had been met by increased taxes on incomes and possessions. The tax burden was not heavy and was on the whole equitably adjusted. At the outbreak of the war, the total debt amounted to $3,552,500,000, on which the annual interest charge was $122,500,000. By the end of the war, on March 31, 1919, the debt had risen to $37,861,000,000, on which there was an annual interest charge of $1,800,000,000.

The growth of the interest payments on the debt during the war are shown in the following table:

Year.	Amount.	Year.	Amount.
1914	$122,500,000	1918	$949,255,300
1915	113,344,180	1919	1,332,668,060
1916	301,246,555	1920	1,800,000,000
1917	636,252,470		

It is not possible to trace the growth of the civil budget throughout the period of the war, as the army and navy expenditures were transferred from this to the war account, and other items were scaled down or entirely omitted. It will probably suffice to contrast the last peace budget for the year ending March 31, 1914, with the budget just passed for the year ending March 31, 1920. In the former case the civil budget amounted to $864,964,845 and interest payments to $122,500,000, giving total expenditures of $987,464,845. Against this

the revenues amounted to $991,205,000, giving a surplus of almost $4,000,000. The budget for 1920 stands in striking contrast with this. The total expenditures are estimated at $7,174,550,000, of which the interest on the debt accounts for $1,800,000,000. The remaining $5,375,000,000 is about equally divided between civil and war expenditures. Against this enormous total there are estimated revenues amounting to $4,800,000,000, to which an additional $1,000,000,000 is added from the sale of assets. This leaves a deficit of $1,375,000,000, which it is proposed to meet by further borrowing. For this purpose a new loan of $1,250,000,000 has just been voted by Parliament. It will be noticed that the interest payments now amount to more than double the total civil budget before the war, in addition to which the civil budget itself has been enormously swollen by pensions and added costs, such as the civil service bonus (of $20,000,000), the loans to Allies ($140,000,000), liabilities "in respect of coal" ($100,000,000), unemployment benefit ($40,000,000), etc. Even if it could be assumed that as a result of universal disarmament all military and naval expenditures would be at once discontinued, Great Britain would be left with a heavy burden as a result of the war.

To meet these growing expenditures taxes have been imposed which before the war would have been regarded as unbearable. They rest now with oppressive weight on wealth and large incomes, the latter being taxed under certain circumstances as high as 67 per cent. But further sources of revenue will have to be secured in the form of heavier imposts on the consumable commodities. The following table shows the growth of revenues in Great Britain since 1914:

Year.	Amount.	Year.	Amount.
1914	$991,214,485	1918	$3,536,170,000
1915	1,133,470,000	1919	4,444,103,000
1916	1,683,830,000	1920 (estimated)	4,800,600,000
1917	2,867,145,000		

As the last budget contains expenditures directly attributable to the war which may be expected to disappear shortly, and as, on the other hand, the revenue account covers taxes which are also temporary and certain to decrease (such as the war-profits tax, the rate on which was reduced by the same act from 80 to 40 per cent), Mr. Austen Chamberlain, chancellor of the exchequer, at the same time presented an estimate of what he called a "normal" year budget. According to his statement, the expenditures in a normal year may be expected to amount to $3,830,000,000, while the normal revenues were set down at only $3,260,000,000. If further borrowing is to be avoided, as, of course, will be essential in a "normal" budget, then

new sources of revenue will have to be found. In round numbers, revenues amounting to about $4,000,000,000 will have to be raised as against $1,000,000,000 before the war.

This will constitute a heavy burden, but not necessarily an unbearable one. New powers of productive efficiency have been developed among the British people during the war, and the ability to produce goods and to meet foreign competition in competitive markets has probably been heightened. Much depends upon the solution of labor difficulties, but it may be assumed that proper steps will be taken to meet the legitimate demands of the working classes. If the morals and spirit of the nation is sustained, there is no reason to doubt the ability of the British people to carry the present load of debt and current charges.

France.

Before the war France had serious budget difficulties. The French debt was the greatest of any country in Europe, both absolutely and per capita, the interest charges amounting to almost one-third of the annual budget. As a result of this fact and the increase in her army appropriations, a series of deficits had existed for several years. The last financial act before the war was to vote a bond issue for $180,000,000 to meet the current deficit. The difficulty of meeting expenditures out of current revenue has been enormously aggravated by the war. The expenditures have increased from about $1,000,000,000 to over $3,700,000,000. By far the most important item under expenditures is the interest charge. The following table shows the civil expenditures and debt charges for the period of the war:

Year.	Civil expenditure.	Interest on debt.	Total.
1913	$686,404,000	$261,317,000	$947,721,000
1914	.....	273,242,000	.....
1915	498,937,000	379,879,000	869,814,000
1916	474,345,000	666,603,000	1,140,948,000
1917	557,250,000	972,677,000	1,529,927,000
1918	558,732,000	1,113,570,000	[1] 1,627,292,000
1919	.....	.....	[1] 1,785,200,000

[1] Estimated.

The French debt has grown as a result of the war from $6,577,761,902 on January 1, 1914, to $23,033,211,654 on January 1, 1918. To-day the debt amounts approximately to $30,000,000,000, on which the annual interest charge will be not less than $1,500,000,000. If to this there be added ordinary civil expenditures which, as a result of higher prices and additional burdens entailed by the work of reconstruction, amounting to not less than $1,000,000,000, and military pensions estimated at $800,000,000, to-

gether with some minor items, the total expenditures for the year 1919 are budgeted at a round total of about $3,700,000,000. As the present fiscal system brings in revenues amounting to only about $1,700,000,000, it is clear that a wide gap exists between the estimated expenditures and the available revenues of the French Government. Not only is budgetary equilibrium not established in the present budget, but it does not seem possible that it can be. In the following table are shown the Government revenues for the period of the war:

Year.	Nontax.	Tax.	Total.
1913	$230,182,100	$697,729,406	$927,911,506
1914	211,014,000	585,807,387	796,821,387
1915	204,650,800	572,144,017	776,794,817
1916	236,569,500	696,716,948	933,286,448
1917			
1918	450,515,667	1,225,211,991	1,675,727,658

There has always been evidence among the French people of a disinclination to submit to direct taxes; even during the war most of the taxes were indirect, the income tax not being levied until 1916, and then only at very low rates and with very high exemptions. Before revenues can be made to equal expenditures it will be necessary, however, to apply a drastic and far-reaching system of direct taxation. There seems, moreover, no likelihood that the French people will adopt the radical method of scaling down the debt by means of a capital levy. Hope had been entertained of an enormous indemnity from Germany, which would permit a material reduction in the debt to one-half or one-third of its present amount, but in this there will be a great disappointment. The debt will continue probably without much diminution and will constitute a crushing burden to the French people, but it may reasonably be predicted that the nation will shoulder the load as they did the indemnity of 1871. Fortunately, the larger part of the debt is held internally, so that if the system of taxation is properly adjusted it will be possible to tax the bondholders for the interest payments to themselves. Even were this done, however, the war has imposed a crushing burden upon France which can only be borne at the expense of the sacrifice of everything nonessential and possibly at the cost of a reduction in the standard of living. The additional expenditures called for in the present budget will absorb practically all the margin of production over the necessaries of life. The question of national solvency is largely one of national spirit and the willingness to undergo further sacrifices.

Italy.

Italy has been living beyond her means for a number of years prior to the outbreak of the Great War. In spite of heavy taxation,

which took practically all their available surplus from the people, the public finances showed periodic deficits. Italy was vainly trying to maintain an expensive army and navy in competition with wealthier and stronger neighbors, and was ruining herself in the attempt. The standard of life was low, industrial development was backward and was retarded by the diversion of capital to unprofitable uses, and the burden of taxation was crushing. If this was the situation in peace times it may fairly be concluded that war has practically bankrupted the nation. Expenditures for the last normal year before the war (fiscal year ending June 30, 1914) amounted to $537,540,000. This modest sum is now more than exceeded by the interest charges on the debt, the principal of which grew from $2,967,800,000 on July 1, 1914, to $12,618,600,000 on October 31, 1918. The growth of the interest charges are shown in the following table:

Year ending June 30—	Amount.	Year ending June 30—	Amount.
1914	$104,600,000	1917	$255,607,589
1915	114,400,000	1918	382,023,327
1916	154,000,000		

This table comprises only interest on the funded debt, but, in addition to this, there were on the last-named date various outstanding obligations which materially increased the debt charge. Interest on the floating debt amounted to about $172,000,000, while interest on advances from banks was $28,000,000 and other items about $8,000,000, so that the total interest payment for 1918 amounted to $590,000,000. A recent article[1] presents the following table, showing the principal items in the post-war budget which may be assumed to apply to the next fiscal year:

Item.	Amount.
Interest on war debt	$590,000,000
Sinking fund of foreign debt	48,000,000
Increased salaries to officials	150,000,000
Exchange on payments abroad	120,000,000
State contributions to insurance schools, etc	52,000,000
War pensions, etc	112,000,000
Expenditure for collection of new taxes	30,000,000
Increased civil budget	1,102,000,000
	2,204,000,000

Large as this total is, it may be noted that it does not include the outlay for public works and for the reconstruction of the liberated territory.

Against these expenditures the ordinary revenue is estimated, according to the present budget, at only $1,108,000,000, and even this insuf-

[1] Economist, London, Apr. 26, 1919, p. 689.

ficient sum will probably be curtailed by the cessation of the war-profits tax, so that a liberal calculation can not estimate the revenues at more than $1,000,000,000. The growth of the revenues of the Italian Government are shown in the following table:

Fiscal year ending June 30—	Amount.	Fiscal year ending June 30—	Amount.
1914	$466,600,000	1917	$761,400,000
1915	486,600,000	1918	891,400,000
1916	502,800,000	1919	[1] 1,108,000,000

[1] Estimated.

During the course of the war, taxes and other revenues have been gradually screwed up to the top notch and now rest upon every conceivable commodity, transaction, and form of realized wealth. Some of these are purely war measures and temporary in their nature and will disappear, while the embargo on imports and the desire to protect native industries will act to keep down or reduce customs duties. A difficult if not impossible problem is presented to Italy of bringing her swoolen expenditures and her revenues into equilibrium. The burden of taxation upon the Italian people is already crushing, and it is scarcely conceivable that more can be raised from this source. The fiscal situation is aggravated by a greatly depreciated currency and unfavorable rates of foreign exchange, both of which impose an additional burden upon Italy in meeting her foreign obligations. It is difficult to see how Italy can maintain her normal governmental functions and carry the burden of the interest on the war debt, war pensions, and other charges incidental to the war. It is altogether probable that some desperate measure will be undertaken falling short of repudiation, such as a capital levy, a postponement of interest payments, or meeting them in noninterest-bearing scrip, or some similar device which will postpone a part of the annual burden to a more convenient period.

Germany.

Since 1870 Germany had made tremendous industrial progress, but the standards of life of the people had remained simple and a large part of the increased productivity of the German nation had been diverted by means of skillfully devised taxes into armament. By 1913, however, the burden of taxation was beginning to press heavily upon the people. An enlargement of the army and the expansion of the navy were to be met by the imposition of the Wehrbeitrag, a single nonrecurring levy upon capital and income which was designed to bring in $250,000,000. The burden of this fell especially upon the wealthy class, who in 1914 chose war, which might yield a profit, as an escape from this otherwise certain burden.

The financial situation in Germany for the last fiscal year before the outbreak of the war was a sound one. The expenditures and revenues for the fiscal year ending March 31, 1914, balanced at $924,008,300, while the modest debt of $1,250,000,000 called for interest charges amounting to about $50,000,000. It is impossible to trace the expenditures or revenues of Germany during the war period, owing to the secrecy maintained by the Government, but a memorandum presented in February, 1919, to the National Assembly at Weimar by Dr. Schiffer, the Minister of Finance, gave some information on other points.[1] The growth of the interest payments on the national debt were given by him as follows:

Year ending Mar. 31—	Amount.	Year ending Mar. 31—	Amount.
1915	$46,050,000	1918	$872,325,000
1916	299,375,000	1919	1,477,075,000
1917	582,575,000	1920	1,975,000,000

Dr. Schiffer estimated that the national annual expenditures for the future for the civil budget and the debt charges would be $2,500,000,000, compared with $900,000,000 before the war. The annual expenditures of the States and communes would be about $1,250,000,000, compared with $750,000,000 before the war, the difference measuring the war burdens imposed upon the local units. The total amount of revenue to be raised by taxation in the future would therefore be $3,750,000,000. Before the war only $1,250,000,000 was raised by taxation. These figures moreover do not include the indemnity to be paid to the Entente Allies. If this be taken into account, the annual charges upon the German people will not be less than $5,000,000,000.

If national bankruptcy is to be avoided, it is clear that taxation of the most drastic character, both direct and indirect, will have to be adopted. The more radical method of scaling down the debt by some 25 or 30 per cent by means of a capital levy has found favor in Germany. Dr. Schiffer has promised that the debt will not be repudiated, but if this is to be avoided the management of post-war finance will call for more skill than the financing of the war itself received.

In spite of the enormous burdens now imposed upon the German people there is reason to believe that their industrial intelligence, their habits of industry and thrift, and their national tenacity will enable them to assume and finally liquidate this indebtedness. It may and probably will involve a temporary suspension of the interest payments on the domestic debt, but ultimately even these charges will probably be met.

[1] Vossische Zeitung, Feb. 16, 1919.

OBSERVATIONS OF CONDITIONS IN BOLSHEVIK TERRITORY.

Source: Reliable.

(11612 H)

23 June 1919.

On Thursday, April 24, I left Archangel, arrived at Obezerskaya and reported to Brig. Gen. Turner (British) and met Capt. A. Barbier (French) and Capt. E. M. While (British), the other members of the allied commission.

Our instructions from Maj. Gen. Ironside limited our authority to the discussion of the exchange of prisoners captured on the Northern Front. A letter definitely stated that we were not dealing with the Bolshevik government, but only with the armed forces opposite us; our instructions limited our right to proceed into Bolshevik territory only as far as Plessetzkaya.

On Saturday, April 25, we received word that the Bolshevik Commissar would be ready to meet us and deliver four hostages at 1 o'clock on the following day.

On Sunday, April 26, we proceeded along the railroad with white flags to a point midway between the opposing front-line trenches; there we were met by a Bolshevik Commissar, who received our letter of authority and then stated that we could not remain at Plessetzkaya but would be compelled to proceed to Vologda.

We arranged for another meeting at 6 p. m. the same day; then telegraphed Gen. Ironside and obtained authority to proceed to Vologda.

We met again on the railroad at 6 p. m., received their hostages, were then blindfolded and walked along the railroad for a distance of about 3 versts, where a private car (international type sleeping car) was provided for us.

At Plessetzkaya we were invited into the private car of the commander of the Eighteenth Division, a young man about 26 years of age, named Puberovitch, formerly a lieutenant in the Imperial Russian Army. He had dinner prepared for us and engaged us in conversation for about two hours. We then proceeded on our way and arrived in Vologda Monday, April 28, at 4.30 p. m. Motor cars conveyed us to a house prepared for us.

We took our own provisions, a cook, and one man with us, but were provided while there with fresh meats, potatoes, butter, bread, and milk.

We had our first formal meeting with their commissioners on the next day.

On May 3 the Bolshevik Commission were instructed that they were not empowered to deal with any but 22 prisoners then in Vo-

logda, only 2 of whom were Americans, and if we refused to treat for them to permit us to return.

About three hours before departure I was informed that I could take with me the two American prisoners then in Vologda without requiring from us any exchange.

It later appeared that one of these prisoners, August B. Peterson, Company H, Three hundred and thirty-ninth Infantry, had died in the hospital, and a medical certificate was furnished showing his wounds, mental condition, and death.

The other prisoner, Earl Fulcher, of the same company, was delivered to me and brought back by me to Archangel. He had been slightly wounded (machine gun), but had been able to walk for a week and was in good condition physically.

We left Vologda at 6.30 p. m., May 3, and arrived at Plessetzkaya Sunday, May 4, at 3.30; again had dinner with Commander Puberovitch and were informed that by agreement with the commander of our forces we would cross the line on the following day at noon. At noon the following day their hostages were brought to the line and we were permitted to return to ours. We arrived at Archangel at 7 p. m. May 4 and on May 5 reported to Gen. Ironside.

During our five days in Vologda we were permitted complete freedom of movement about the city and spent from four to six hours every day in walking about. We were also permitted to interview all of the 21 prisoners in Vologda, had many conversations with the five members of the commission and a number of other individuals who were brought to see us. The observations that follow are based upon conversations with these men, statements that appeared in their newspapers, and personal observations about the city.

Observations.

Bolshevik Commissioners.

Naumov, chairman of their commission, is a workman about 32 years old, aggressive, a good speaker, intelligent, and very much like the better type of our labor leaders. He is a member of the Bolshevik party organization.

Minitcheff is a workman about 36 years old, in appearance rougher than Naumov, not nearly so able, of the type that assimilates what is told him without attempting to reason the matter himself. He claims that he was one of the delegates to the Brest-Litovsk treaty negotiations. He is a member of the Bolshevik party organization.

Kuni is 32 years old, a native of Kostroma, a member of the Social Revolutionary Party, educated in France and Germany, who went to the Gymnasium in Germany; he is reputed to have been very wealthy before the war. He stated that he was the owner of a very large brewery and large estates, including 16 houses. He

speaks fluent German and some French, and has traveled throughout Europe. He is evidently not wholly in sympathy with the Bolsheviks, but stated that he could not "tell everything"; that affairs were neither as bad nor as good as were painted.

Ossetrov is a young sailor attached to the staff of Chicherin, People's Commissar for Foreign Affairs, only 22 years old, a graduate of the University at Moscow. He speaks English, but not fluently, and is a member of the Bolshevik party organization.

Blumfield, about 27 years old, was born in Russia, but came to England when 1 month old. While there he was a member of the Independent Labor Party and an internationalist, and was deported to Russia in January, 1917, under the Defense of the Realm act. He is just beginning to speak Russian and is also attached to Chicherin's staff and is a member of the "English-speaking group of Communists."

Propaganda.

Every act of the Bolshevik Government is quite apparently dictated by the desire to make a favorable impression upon Allied public opinion, especially of the working class, and advantage is taken of every opportunity to present their case in the most favorable light. This is evidenced by their conversations, their public speeches made on May day, their treatment of prisoners, and their printed propaganda.

Treatment of Prisoners.

Once the prisoner has passed beyond the front combat line he is taken to some center and given almost complete liberty, provided with good lodgings, generally in private families, given the full ration of food provided for the Red Army, allowed to work if he chooses and paid for his work at rates varying from 600 to 1,000 roubles per month; allowed to visit theaters and other places of amusement; if wounded, taken to a hospital and given the same treatment received by the wounded of the Red Army, with additional food and some delicacies. All the prisoners are provided with propaganda literature printed in the language that they speak.

When we arrived in Vologda we were informed that six British and five Americans had already been sent to Stockholm without requiring exchange, and it is probable that others will be sent out at what are considered strategic points for propaganda purposes. It was intimated to me, but not stated as a conclusion, that probably the six Americans still in Moscow would be released this month. We were permitted to talk to all of our prisoners, and those who were in the hospital were brought to us in motor cars. All testified to good treatment.

Food Conditions.

The present ration of food for the Red Army is 1 pound of white bread per day, two large lumps of sugar tea, oatmeal or rice, meat twice a day, and soup. The civilian ration is three-fourths of that amount.

Food, especially bread and meat, has been very scarce, but since the opening of the Ukraine they claim that it is very much improved, and we were supplied with a very good quality of black bread, said to have come from Ukraine. Food conditions in Petrograd and Moscow are alleged to have materially improved during the last month.

The food is furnished to the civilian population by means of food coupons entitling the bearer to obtain the same at certain designated Government stores.

The markets in Vologda also afford very limited quantities of butter, milk, berries, cabbage, potatoes, and eggs. These can be purchased from the peasants. The only things priced by us were eggs and butter. Eggs were 70 roubles for 10 and butter 80 roubles per pound. Two weeks previously the price of butter was 48 roubles, but the conditions of the roads prohibit bringing in products.

Clothing.

Women's clothing seemed to be good and fairly abundant; the women appeared neatly dressed, and their shoes all looked new. The men appeared to be well shod, but, generally, poorly dressed. It was admitted that there was a great shortage of cloth, and that most of the wool was being used for army clothing.

Schools.

The Bolsheviks make the greatest claims for their educational system. They have adopted the Montessiori and Gary system in the primary schools and established proletariat universities.

Here, in addition to the usual studies, the pupils are instructed in the political doctrine of the Bolshevik Party. Large numbers of these schools are established everywhere, and where districts are too remote phonographic records are prepared, containing speeches in simple language, and sent to these districts.

It was quite evident that the greatest energy is being used thoroughly to spread their political faith, and new means are being tried every day to reach the public, such as propaganda trains with printing presses to print newspapers up to date each day.

Army Schools.

At Moscow and two other places, not mentioned, are established officers' training schools, consisting of a six months' course. In addition to the military training, each officer is instructed to become a propagandist among his command. The military instruction is given

by officers formerly in the Imperial Army. It was claimed that at Moscow from 100 to 300 officers are being graduated each week.

Army.

The conscription system is in effect, and in addition special volunteers from the Bolshevik Party are obtained. The volunteers constitute special groups and are put, for stiffening purposes, among the other regiments. All of them are propagandists.

The parts of the army that we observed, about 1,800 men, range from very good to poor in marching and in drill. They were all equipped with Japanese rifles and bayonets and dressed in their new summer uniforms. The new uniform consists of a soft cap, which can be pulled down over the ears and comes to a point in the center, with a soft visor and the five-pointed star in red enamel in front. A blouse, with high collar is worn, which takes the place of a shirt; breeches, spiral puttees, and heavy black shoes. The clothing is of a greenish khaki color. Overcoats are of a reddish gray, and very long.

We saw two armored motors cars in Vologda and about six machine guns. The Sixth Army Headquarters is located in a large building in the center of the town, of reddish gray brick, formerly the Golden Anchor Hotel. Opposite it is a large church and a park.

The Bolsheviks are aiming to establish an army of 3,000,000 men, and colored posters of large size announce the coming of such an army. Officers interviewed said "it will soon be," but did not state when. Nothing compared to that exists now. There are probably not so many as a million, but more than half a million.

Industry.

So far as we could learn no such thing as private industry exists except on the small peasant scale of village industry. All the larger industries are turned over to the Government and are used primarily for manufacturing munitions and army clothing. The Putilov Works are said to be running to capacity. There seems to be plenty of clothing and shoes for the army, but the shops are bare of anything but the absolute necessaries of existence, and these are not abundant. There were no new automobiles; those that we saw were of English make and the trucks were Fiat trucks. Some of them had new tires.

Railroad.

There is an abundance of rolling stock, but most of it needs repair. Vologda, a place where there were formerly large car repair shops, does not now seem to have the technical equipment to handle a decent job in car repairing, because a car that had recently gone into the shops for repair and refinishing was turned over to us for our return journey, and it had three flat wheels. The time con-

sumed in journeys is far greater than formerly. It took 20 hours to proceed 400 versts. The railroad station, a beautiful brick and stone building, stated to have been burned, is intact.

River Transportation.

The Sukhona River runs through Vologda and is navigable by large light-draft steamers and connection is obtainable with southern and eastern cities. While we were there we noticed five large, newly-painted steamers, but the only cargo seemed to be some hemp and flax. There were about 150 barges lined along the shores.

Churches.

There are 57 churches in Vologda. The churches and priests were unmolested and worship therein was constantly observable, the bells ringing the time of service as in the olden days. One of the churches has been turned into a university. The Bolsheviks resent greatly the statements that priests are killed and said that the only priests killed were those engaged in counterrevolutionary activity.

Nationalization of Women.

This is the subject upon which the Bolshevik is most touchy, and he bitterly denounces statements concerning nationalization as deliberate allied propaganda with absolutely no basis of fact, save for the proposal of a group of anarchists in the city of Saratov, which was promptly denounced by the Bolshevik government and never anywhere attempted to be carried into effect. They hope that the knowledge that there is no basis in fact for these statements will react in their favor by leading men to believe that most of the other things said about them are untrue.

May-Day Parade.

On May 1 we were provided with special quarters to see the great May-Day parade. The city was decorated with red flags, red bunting, red banners, and evergreens, and trimmed with electric lights. The parade consisted of a military and civil section. The military consisted of 1,800 men, infantry, with about 60 cavalry; the civilian section consisted of about 2,500 workingmen and women and some school children. Three bands were in the parade and the International was sung as was also the Marseillaise. The parade was reviewed in front of Sixth Army Headquarters. Gen. Somalio, chief of staff of the Sixth Army, and four others addressed them. The tenor of all of the speeches was a bitter denunciation of Kolchak as an imperialist, who was at that moment being severely defeated. There

was a denunciation of the allies for hemming them in and attempting to starve them, and allegations of a determination on the part of the allies to seize their forest lines and seaports and keep them. The crowd was assured that the Red Army would successfully defend them and that "The Proletariat of the World" would ultimately be an actuality. The speakers were cheered, but by no means with the enthusiasm of an American audience.

"RUSSIA'S MOBILIZATION FOR THE WORLD WAR."

Source: Reliable.

(10911)

22 June 1919.

It is known that the German authorities are gathering evidence to show that the responsibility for the war can not be placed at Germany's door, according to the press of May 23. The plan is to publish Russia's guilt first, and that of England afterwards. There is ready at the present time at Dusseldorf for immediate use a booklet bearing the title "Russia's Mobilization for the World War."

JAPANESE NEW NAVAL ARSENAL—CONSTRUCTION OF JAPANESE SUBMARINES.

Source: "Toyo Shimppo" (Newspaper).

(6452)

22 May 1919.

Our new Naval Aeroplane Construction Arsenal has been completed at Hiromura, Hiroshima Prefecture, as a branch of Kure Naval Station.

As for the study of the construction of submarines, our Government took the method of inspection by sending about 300 engineers, assistant engineers, and workmen to Italy and France during the war time. The navies of those countries were leaders in submarine construction. Those men are coming back with seven former German large and middle-sized submarines which are to be stationed at Yokosuka Navy Port on June 27 as our new naval force. With the knowledge of their inspections and their experiences during their voyage our Government will commence the construction of submarines on a large scale which has been approved by both the Fortieth and Forty-first Diets. The commencement of construction and the number of the new submarines are kept secret.

According to reports, it appears that after the launching of *No. 23*, warship, at Kure, which will take place shortly, the construction of

submarines for our navy will commence. Our Government has distributed orders for these among the following:

Kure Naval Dockyard.
Maizuru Naval Dockyard.
Sasebo Naval Dockyard.
Yokosuka Naval Dockyard.
Kawasaki Dockyard.
Mitsubishi Dockyard.

The latter two are private concerns which our naval authorities consider capable of constructing submarines.

During Taisho 8th year (1919), we will have about 40 submarines on our Navy list and also the "First Submarine Group," which will be organized shortly for the "Independent Fleet Organizations," which will be attached to its three "Standing Squadrons." The remaining submarines will be under the jurisdiction of our naval authorities.

Four of the new submarines will be constructed at Yokosuka Naval Arsenal. Their designated numbers are from 28 to 31, inclusive.

Their construction will commence this coming July on the same shipways on which the *Nomi* and *Kaya* (second-class destroyers) are being built. The launching of these destroyers will take place on June 10 at 3 and 3.30 p. m., respectively.

As for the seven former German submarines which have been turned over to our Government there is an opinion that they should be blown up and sunk, following the plan of the Allies.

In answer to this expressed opinion, we have to state these seven former German submarines were captured by our Navy. Therefore there is no necessity for the ultimate fate either to be restricted by the Allies or to be decided by the Peace Conference.

These seven submarines are especially precious things for us, for we will have spent over yen 300,000.00 of our national fund for their trip from European waters to Japan. It is said that after they reach Yokosuka and after being properly repaired they will be commissioned for active duty in the Navy gradually and together with the above-mentioned new submarines after the latter are completed and commissioned.

JAPANESE NAVAL ACADEMY.

Source: Reliable.

(1059)

29 May 1919.

This school (which corresponds to the United States Naval Academy) is located on the Island of Etajima, on the Inland Sea, only 12 miles from the Kure Naval Station.

It has been in the present location about 25 years, having previously occupied the buildings at the Naval Club in Tokyo.

There are to-day 480 cadets, but the number is to be increased in September to 800. A new dormitory and new bath and wash houses are to be completed by that time. The plant is an excellent, though unpretentious, one. Spartan simplicity is nearly everywhere the rule. The cadets scrub their own clothes and presented a very fine, clean, smart appearance. They looked very healthy and happy, and moved on the double. There is Swedish exercise twice a day, and jiu-jitsu or fencing every afternoon. They have five hours' study and recreation during the daytime, and two hours' study at night. The classrooms accommodate about 25 cadets.

There are good models of boilers, valve motion, sections of cylinders, etc., in steam engineering; a good electrical department, an excellent seamanship hall, and classrooms, good sextants, compass compensation, etc., for navigation work, a good gun shed with calibers up to and including 6 inch, with old-fashioned fire control from above, a model of an antiquated turret, a fine drill ground, pulling boats, etc.

English is taught from entrance to graduation. They read with expression and intelligence.

The course is three years at the school and one year afloat; then commissioned a sublieutenant after examination afloat.

The superintendent is a vice admiral, and the commandant of cadets is a captain.

The cadets are obtained by annual competitive examinations sent out by the Navy Department and held by the principals of the middle public schools at 41 places in Japan. Upon arrival at the naval school later the successful boys, all between 16 and 20, are again examined for entrance, and only about 55 per cent pass in. Once in, only about 2 per cent fail mentally and 1 per cent physically every year.

The boys get their uniforms, textbooks, and living free, and a little pay. They get one month's leave in summer, June 15 to July 15 (about), and two weeks, including Christmas. There are two princes at the school. They have a room together. The other cadets sleep in dormitories, 120 in each great room. One steam pipe from a plant 25 years old in each room.

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CONFIDENTIAL

Number 8—1919

OFFICE OF NAVAL INTELLIGENCE

MONTHLY INFORMATION BULLETIN

15 AUGUST 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 August 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

MONTHLY INFORMATION BULLETIN.

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15 AUGUST 1919.

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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1919

CONFIDENTIAL.

OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 8—1919—15 August 1919.

FOR CONVENIENCE IN ROUTING.

Officer.	Initials.	Date received.	Date forwarded.
Captain			
Executive Officer			
First Lieutenant			
Navigating Officer			
Gunnery Officer			
Communication Officer			
Engineer Officer			
Medical Officer			
Supply Officer			
First Division Officer			
Second Division Officer			
Third Division Officer			
Fourth Division Officer			
Fifth Division Officer			
Marine Officer			

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AVIATION.

REPORT OF TRANS-ATLANTIC FLIGHT—H. M. S. "R–34."

Source: Reliable.

6 July 1919.

(11937.)

The *R-34*, one of the latest class of British rigid airships, was built by Sir William Beardmore (Ltd.), Inchinnan, Scotland, near Glasgow. After the satisfactory completion of her trials, the British air ministry decided to send this ship on a trans-Atlantic flight from RnAS, East Fortune, Scotland, to New York, United States of America, and return.

The general characteristics of the *R-34* are:

Capacity (gas), (cubic feet, approximately)	2,000,000
Length, feet	642
Beam, feet	79
Height, feet	95

The airship is constructed of duralumin with a keel, and the shape is streamlined. It contains 19 gas bags, goldbeater-skin lined. There are four cars and five 250-horsepower Sunbeam engines. In the forward car, forward part, are the controls for rudders, elevators, top gas valves, water ballast, and engine room indicators; a chart table and navigational instruments, including compass, sextants, drift finding instruments, etc., and the usual flying instruments, such as statiscopes, altimeters, inclinometers, rate of ascent and descent recorder, air and gas thermometer, sea-level barometer and speed indicators. Amidships in this car is a radio cabin complete, including direction finding instruments, and in the after part is an engine room with one engine. There are two amidship engine room cars, port and starboard, each fitted with one engine. The amidship propellers are reversible. A great deal of efficiency is lost, however, when going astern, and little check is produced on the ship's headway. The after car contains two engines on one shaft, and this car is fitted with auxiliary controls for the rudders and elevators.

The petrol or gasoline supply is carried in the keel in tanks secured to the girders. Forward, amidships and aft over the engine

rooms is a system of fixed tanks. A number of slip tanks or tanks that can be bodily released, are placed along the keel, and may be considered as ballast. The fuel may be pumped from forward and aft as the case may be, to correct the trim. The water ballast bags are carried along the keel, and there is one ton of emergency water ballast well forward and one ton well aft fitted with a quick release.

The mooring point forward is strengthened with additional girders and the strain is distributed to several frames by cables, leading forward, aft, and overhead. Two drag ropes and a drogue or sea anchor are carried forward. A cat walk 12 inches in width runs the length of the keel, and is widened out for a length of about 30 feet between the forward and amidship car positions. This space is used as a mess deck and living quarters. During meal times, the ship was usually nose heavy, due to the crew gathering in the living quarters. This condition would be corrected by moving the living quarters further aft and nearer the center of buoyancy.

Each gas bag is fitted with an automatic gas valve 30 inches in diameter near the bottom of the bag, and easily accessible from the keel. A tube made of hoops is placed at every other interval between the bags to insure a separation, when full, permitting the exhaust gas to escape from the keel to the outlet on top of the ship. The valves are so placed that two gas bags exhaust through the same tubes. The exhaust forward of the forward gun platform is led off to one side in order to carry the escaping gas well clear of a gun's discharge. Twelve of the 19 gas bags are fitted with top gas valves controlled either individually or collectively from the forward car.

A gun tube leads from the keel to the forward gun platform and it affords access to the top of the ship. This was useful in taking observations of heavenly bodies that were nearly overhead, and for obtaining a complete view of the heavens when studying the clouds. The bomb racks are fitted amidships at the center of buoyancy, and the bomb release is controlled from the forward car. On the trans-Atlantic flight food lockers were installed in the bomb rack positions.

The *R–34* displaces 60 tons and has a useful lift under standard conditions of pressure and temperature of 25.9 tons. She is very similar in design and characteristics to the 1916 German Zeppelins, although several improvements have been made, such as the installation of a main gas line running the length of the starboard side, making it unnecessary to connect up each gas bag individually when gassing. The gas connection to the main is made forward, the bags not requiring gas are tied off, and the connection to the main from the bags taking gas untied.

Personnel.

The complement of the *R–34* for the trans-Atlantic flight was as follows:

Captain.
First officer.
Second officer.
Engineer officer.
} Regularly attached.

Navigating officer.
Meteorological officer.
Radio officer.
} Additional for trans-Atlantic flight.

Three others.
One warrant officer, ship's coxswain.
Nineteen petty officers and men.

Trans-Atlantic Flight.

The conditions in the shed on the early morning of July 2, 1919, prior to making the trans-Atlantic flight with the *R–34*, were as follows:

Temperature 44° F. Barometer 29″.7. Purity 95 plus.	Tons.
Petrol or gasoline	15.8
Oil	.9
Water ballast	3.0
Crew and gear	4.0
Spares	.2
Drinking water	.42
Total useful lift	24.32

The weather for the 48 hours preceding the get-away was stormy, but the wind dropped somewhat during the late evening of July 1. The weather chart of the Atlantic, however, was very favorable, with two large anticyclonic areas between Ireland and Newfoundland. It was decided, if the weather was such as to permit taking the ship out of the shed, the start would be made on schedule time at 2 a. m., July 2, and that favorable weather conditions would be found when west of Ireland.

Gassing was carried on during the evening, and 49,000 gallons of petrol was taken aboard. This supply, although ample, in crossing the Atlantic from west to east was found to be insufficient for the east-to-west journey, and it was only by the most careful conservation of fuel that the ship arrived at its destination, Roosevelt Field, Mineola, Long Island, N. Y., at 9.54 a. m., July 6, 1919.

The landing party, numbering about 550, assembled at 12.45 a. m. and the crew took flying stations at 1 a. m. The ship was weighed off carefully, the engines given a short run, and the elevator and rudder controls tested, in the shed. The ship was then walked out

the leeward end of the shed, wind east-northeast, 15 knots per hour on the deck. At 1.42 a. m., G. M. T., the order "let go," was given, and the ship rose slowly. A mist at 200 feet completely enveloped the ship and cut off the view of the ground, and as the ship was rising very slowly with a tail-heavy tendency, one-fourth ton of water ballast was let go aft. The ship rose to 1,000 feet where the engines were started, and a westerly course set standing up the Firth of Forth.

Extremely bumpy air conditions were experienced crossing Scotland, particularly after reaching the Clyde, where the terrain in the vicinity is more rugged. The altitude over Scotland was 1,500 feet, above the mist and clouds, and on account of the hill country this was only just sufficient for safety, in the disturbed air conditions with the ship somewhat heavy. The wind was easterly and about 18 knots per hour. After reaching the sea, with the arrival of daylight, the ship became perfectly steady, and there were few bumps again experienced until the thunder squalls were encountered in the Bay of Fundy and Gulf of Maine, on July 5. In winds of 45 knots per hour and all conditions of sun, cloud, rain, and fog, the airship oversea was as steady as a rock, except for a time in the depression off Newfoundland.

After carefully checking wind and drift on the islands north of Ireland a course of 298° p. s. c., making good about 289° p. s. c., air speed 38 knots per hour, 4 engines, wind 12 knots per hour, northeasterly; altitude 1,500 feet. Thick clouds and fog were soon encountered, the fog clearing sufficiently later on to permit catching glimpses of the sea and estimating drift. The 1,500-foot altitude carried the ship above the clouds, permitting Mark St. Hilaire observations of the sun on a reasonably level cloud horizon. It was decided during the forenoon to run on two engines, 1,600 revolutions, as this gave a speed of 30 knots per hour, and an easterly wind of about 6 knots per hour was assisting. It was realized from the start that it was of the utmost importance to conserve the fuel supply. During the day the wind backed to north and three engines were used. Most of the time the ship was in the clouds. The average low-cloud height in this part of the Atlantic is, roughly, about 1,200 feet. The 6 p. m. position July 2 was latitude 53° 50′ north, longitude 20° west; distance made good, 610 miles.

In the afternoon the high cirrus, the first indications of a depression, were noticed, and about 7 p. m. a radio from the air ministry reported a depression to be entering the western Atlantic from the southward. A heavy rainfall was encountered during the second dogwatch, and an ascent made to 2,900 feet, carrying the ship above the squall. This rain left the ship quite heavy, and with night coming on it required about 20° on the elevator to hold her up, running on five engines. At

8.30 p. m. the speed was increased to 1,800 revolutions on all engines, and a descent made to 1,500 feet. There was an upper layer of clouds at 2,500 feet and a lower layer at 500 feet. It was possible, however, to see the sea occasionally through this lower layer of clouds and check the drift. The object of the high speed at this time was to attempt to pass to the northward of the depression, and thereby benefit by eastward and northeasterly winds. Owing to the clouds, our position on the morning of July 3 was slightly indefinite, and at 1,800 feet, slightly above the clouds, which presented a very level horizon, several excellent sights of the sun were secured, making the 8 a. m. July 3 position latitude 53° north, longitude 35° 30′ west. After fixing the position by observation, a descent was made through the clouds to 800 feet in order to see water and check the drift.

At 2.15 p. m., July 3, our position was latitude 52° 25′ north, longitude 40° 40′ west, halfway from East Fortune to New York, by the course we were making. About this time a breakdown occurred on the starboard amidships engine, due to a slightly cracked cylinder. This was temporarily repaired in a short time. The wind was rapidly increasing in velocity from the south, gradually backing to south-southeast 45 knots per hour. It had kicked up a nasty sea and the ship was making little headway. It was decided advisable to drift to the northward of the course, and after the wind had backed to south-southeast good headway was made in the direction of west by north. It was hoped that the center of the depression might still be left to the southward, and that a favorable shift in the wind would soon come along. The center was fairly accurately located by weather reports from St. John's, Newfoundland, and from H. M. S. *Tiger* stationed at latitude 55° north, longitude 40° west. At St. John's the weather was favorable, with a 12-knot northerly wind, while the *Tiger* had a falling glass, and an increasing southerly wind. In spite of efforts to the contrary, the ship probably passed through the depression center. High winds, very heavy rains, squalls, and some bumps were experienced. An ascent was made to 4,000 feet, and by 8.30 p. m. it had cleared off; the sky was breaking to the westward, and the dark clouds were left behind. At 9.30 p. m. descended to 1,000 feet, where glimpses of the sea could be had, and a flare was dropped and a check on the drift secured. Rose again to 2,500 feet and star sights were attempted on a cloud horizon. Only a few stars were visible, however, and the only one recognizable was Altair. As the horizon was not good, this sight was probably somewhat inaccurate.

On the morning of the Fourth of July, having had little check on wind or position on account of fog and clouds for the preceding 12 hours, several excellent observations of the sun were secured, fixing the position at 6 a. m., as latitude 50° north, longitude 50° west. The

navigator experienced some difficulty in getting these sights, as there were three distinct cloud horizons, an upper layer, at 3,000 feet, second about 2,200 feet, and lower level at 1,200 feet.

As the wind was light, the fog began disappearing with the sun. On a westerly course, the sun on the tail caused superheating aft, making the ship very light aft, necessitating starting up the after engines to keep her nose up. Our position was now over the ice fields, and several icebergs were seen through the mist which was hanging very low over the cold water. The superheatings here was extremely noticeable, the gas temperature reaching 105° F. with the air temperature at 600 feet, about 40° F. An ascent was made to 4,000 feet, where the difference in temperature was less, as the air temperature at this altitude was 60° F. As it was not desired to lose any more gas than necessary, the ship was flown very light, carrying about 14° down rudder. Fortunately, a fog bank appeared, in an hour or so, and a descent was made on all engines into it, where the gas was gradually cooled down. After cooling, the ship was quite heavy. This is an instance of the value of fog or clouds to the airship.

At 12.50 p. m., July 4, the coast of Newfoundland was sighted through the fog, and at 1.30 p. m. the coast line was crossed at Trinity Bay, the time from the north coast of Ireland having been 59 hours. Crossed Newfoundland to Fortune Bay at 1,500 feet, the fog clearing inland, and stood to the westward for the coast of Nova Scotia, speed 36 knots, on three engines, making good 46 knots with a following wind. These favorable conditions, however, did not last long, a head wind sprung up, and the coast of Nova Scotia was finally crossed at 7 a. m., July 5, at Cape Canso. Nova Scotia was crossed from Cape Canso to the Basin of Minas following the St. Marys River valley at an altitude of 600 feet, in order to lessen the effect of the head winds. At 10 a. m., as the ship was light, an ascent was made to 6,000 feet in order to valve gas automatically. Gas was lost from 5,400 feet to 6,000 feet. The gas temperature was 90° F. and the air 76° F. Descended again to 1,000 feet, the ship still light. The foggy haze at this altitude, however, caused the gas to cool down.

At this juncture, as the petrol supply was just sufficient to reach Mineola, provided no unfavorable weather conditions were met, it was decided to send a radio message to Washington, requesting information as to whether or not a destroyer could be sent to our assistance provided it was needed. As the object in requesting a destroyer was to have a surface craft available to take the airship in tow for a part of the distance to Mineola, provided there were head winds, and the time this could best be accomplished was overnight, when the atmospheric conditions are stable, it was decided

at 1 p. m. to send another radio, giving position, course, and speed, and requesting that the destroyer be sent at the earliest possible moment in the hope of having the stand-by destroyer with us before sundown.

By 11.45 a. m., near the eastern end of the Basin of Minas, the wind dropped considerably. At 1 p. m. it was necessary to valve gas aft, as the ship was very light and down by the nose. This was accomplished by using the top gas valves. At 1.20 p. m. more gas was valved as the ship was still light. Our course during the afternoon was southwesterly down the New Brunswick coast of the Bay of Fundy.

During the first dog watch, when near the lower end of the Bay of Fundy, a severe thunder squall was rather suddenly encountered. The atmosphere became hazy and a sudden bump, accompanied by rain, shook the ship severely, driving her from 600 feet to 1,100 feet in a few seconds, totally out of control. A down bump followed, after which there were one or two lesser bumps. We climbed as rapidly as possible in the unstable atmosphere to 3,000 feet, the ship partially out of control. The course was changed to the southeastward, and full speed ahead was rung up on all engines. At 3,000 feet, running seaward at full speed, it was only a short time before we were in clearer and more stable air, and out of the rain.

One of the officers sleeping well aft said that the first bump almost threw him out of his hammock; that the tail of the ship appeared to twist and bend, and that for a few seconds he thought the ship might have been broken. This full speed was rapidly using up the precious petrol, but it was very necessary to get off the coast and clear of other squalls in the vicinity. As soon as the danger had been passed the speed was reduced again to three engines, 1,400 revolutions, and the southwesterly course resumed. The meteorological officer kept a bright lookout for squalls, although they are not at all easy to distinguished, as in a generally hazy atmosphere the squall usually appears as a thicker and darker, poorly defined area.

About 9.30 p. m. another thunder squall, accompanied by thunder, lightning and rain was experienced, necessitating full speed again to seaward. This squall lasted about half an hour. The outer edge of still another squall was struck during the mid-watch on the early morning of July 6, and our former tactics were employed. These bursts of speed were eating up the fuel, and had driven us much further off the coast. It was thought that we might be forced to take on more gasoline at either Chatham or Montauk, and such would have been the case had we encountered any unfavorable wind.

A great deal of difficulty was experienced with the radio, the electrical disturbances greatly increasing the difficulty of transmit-

ting and receiving for the ship's operators, and for a time the radio was out of commission, the receivers having been burned out.

At 4 a. m. Chatham, Cape Cod, was sighted, the first view of the United States of America. Our course took us to the southward of the mainland of the cape, and directly over Martha's Vineyard. By the time we had approached Montauk, a northeasterly wind was helping us, and it was decided to continue our course along the north shore of Long Island to Mineola. A landing was made at 9.42 a. m. July 6, at Mineola, Long Island, with less than one-half hour's steaming supply of fuel on board at full power.

Control of Gas.

Normally, flying as light as possible by daytime, keeping under clouds or in fog when opportunity offered, a great deal of gas was not lost, and taking into consideration loss of fuel, the ship was not very heavy by night. Ballasting is simplified in the north Atlantic, where clouds and fog are prevalent, as the hot sun is kept away from the gas and the temperature differences between day and night are comparatively small. A considerable quantity of water ballast would be needed in hot climates, whereas very little was required except for landing, on the transatlantic flight of the *R–34* The first abnormal condition experienced was the unusual superheating in the hot sun over the ice fields off Newfoundland, as described in the main body of this report. The ship at this time was very light, requiring 14° down rudder to hold her down, with three engines running, and when the gas was cooled down in the fog she was about 1½ tons heavy. This represents, roughly, a difference of about 3 tons or 100,000 cubic feet of gas in lift. The distinct advantage of fog and clouds is illustrated in this connection, as the fog that appeared shortly after the superheating occurred, was of great benefit in preventing continued superheating, and in cooling down the temperature of the gas. The prevalence of clouds most of the way across the Atlantic was another distinct advantage for the ship, and it is well to remain below them during the day except when it is desired to obtain observations of the sun. This also gives one a check on the wind and drift at all times in case there is no low hanging fog over the sea.

The usual system of valving gas is to ascend until the automatic valves open of their own accord, and continue to ascend to a given height until the amount of gas lost is the equivalent of the lift that it is desired to lose. Valving by the automatics which are accessible from the keel possesses the advantage of being safe in case a valve sticks open, as there is little or no pressure in the lower part of the gas bag, except when it is full, and the valve can readily be closed by hand. This method also valves the ship uniformly, and the trim is not disturbed. In case a valve is not properly set and not opening,

the fact is easily discovered, either by glancing at the manometer or by observing the valve. The manometers attached to each bag are of no use when the bags are up to pressure, and the usual method is to estimate the percentage of a bag's fullness by the eye.

In case the ship is light and particularly light forward or aft and the trim cannot be readily established by pumping petrol forward or aft, as the case may be, it is necessary to valve gas by the top valves, either forward or aft, to correct the trim. It is well, however, never to valve by a top gas valve unless absolutely necessary, as, in case a valve should stick open, a great deal of gas would be lost before it would be possible to get a man on top of the ship and close the valve by hand. While over Nova Scotia gas was valved on one occasion from 5,400 to 6,000 feet automatically, roughly 40,000 cubic feet of gas, as the ship had gotten quite light, due to the sun and loss of fuel. More gas was about this time valved aft to overcome the tendency of the tail to rise, as there was no available fuel left to pump aft and correct the trim.

In landing, the ship is balanced off and equilibrium established by valving or letting go ballast. The ship should be preferably slightly light and a trifle nose heavy, frequently making it necessary to send the available members of the crew aft and valve gas aft to bring the tail down. On returning from the 57–hour flight over the Baltic, the *R–34* before reaching the landing ground at East Fortune, was bucking a 45-knot wind at 1,000 feet, with a 22-knot wind on the landing ground. All engines were running full power and to slow down to balance off meant going rapidly astern. Consequently, the ship was landed without ballasting up, and was driven down in a head wind, into the hands of the landing party, about two tons light.

The stern of the ship in landing and taking the air should never be lost sight of by the pilot in the forward car, and to facilitate, the available crew may be moved aft or forward in the keel.

In flying considerably out of trim a certain amount of speed is probably lost, due to the drag off the elevators, and this condition should be avoided.

In flying a rigid in long trips the pilot must look ahead, considering day and night conditions and the probable weather conditions to be encountered later on.

The electric thermometer, registering the air temperature and gas temperature, is useful in determining the difference in temperature between the gas and air and the amount of superheat, and estimating the condition that will exist after the superheat has disappeared. A barometer on a reel of wire is provided for lowering to sea level in order to obtain changes in the barometric pressure and make corrections for the altimeters.

Navigation.

The navigation of the *R-34* was accomplished in much the same manner as if she had been a surface craft, except that the observations of heavenly bodies were taken on a cloud horizon instead of a surface horizon, and the wind's speed and direction were carefully and continually checked by drift indicators in order to determine the airship's course and speed made good.

The navigational instruments on board consisted of A. B. C. and hack chronometers (all watches), compass, sextants, bubble sextant, drift indicators, charts, parallel rulers, dividers, etc., nautical almanac, log tables, declination tables, star charts, etc. The bubble sextant was not used to any extent as it was almost always possible to find a satisfactory cloud horizon, and the Mark St. Hailaire sights of the sun on the cloud horizon, it is estimated, were accurate, to within 50 miles, which is as useful as a 5-mile accuracy on a surface craft. Had the trip been made in latitudes where clear skies predominate, the bubble sextant would have proven very useful.

The bomb site and draft indicator were constantly used in checking the drift and ascertaining the ship's speed and direction. The ship's shadow was found useful in this connection. At night flares were dropped, buoyed by a small air balloon, to keep them afloat on the surface of the water, and these flares proved quite successful. With low fog it is difficult to determine the drift, but usually, always possible to take observations by ascending above the fog. Then, too, a low-hanging fog usually affords an opportunity to catch a glimpse of the sea as it is characteristic of fog to form in patches, and there is, generally, not a great deal of wind under these conditions.

The radio-directional set was not much depended upon in actually determining position. One accurate bearing by radio, however, is very useful and combined with one good sight furnishes an excellent fix. Radio direction navigation will in future, when more satisfactory, be of very great value.

Weather.

All conditions of weather were met during the trip, and the *R-34* successfully withstood the test without mishap to hull, controls, or personnel, although, as previously mentioned, more power and a great fuel capacity would have been of much assistance. The weather reports from the British air ministry were not considered sufficient by the officers concerned, while the information received from the United States was the subject of much praise.

It is of the utmost and vital importance that airships be furnished as complete and accurate meteorological data as it is possible to obtain. A great deal of information can be acquired by a careful study of

the cloud conditions by a competent meteorological officer on board, but this is not sufficient.

The British Admiralty stationed the H. M. S. *Tiger* at latitude 55° north, longitude 40° west, and H. M. S. *Renown* at latitude 60° north, longitude 25° west. These vessels furnished useful meteorological data from their respective positions.

Radio and communications are as necessary as the meteorological service, as the weather information must necessarily be accurately communicated.

ITALIAN DIRIGIBLE PROJECTS.

Source: Reliable.

30 May 1919.

(4856A.)

A large 1,100,000 cubic foot dirigible (known as *T–34*, representing 34,000 cubic meters) is planned by the Italian authorities.

The frame or keel of this dirigible will have 26 panels. The maximum depth of the keel, amidships, is just less than 5 meters. The maximum width of the same is estimated to be not over 10 or 12 feet. The largest tubes used in the construction of the triangular lattice frame girders or elements are 60 millimeters diameter by 2 millimeters thickness. Frames are now under construction. Envelope is under construction. Some 15 draftsmen directed by 5 or 6 engineers are at work on details. Inflation is scheduled for September. It is estimated by those having practical knowledge that the airship will be ready for trial flights in late October and November. Stated "range" (flight in calm, one direction, without landing) is 5,000 to 6,000 kilometers. (Note: It is believed that the actual range is much in excess of this figure.)

All the personnel is carried in spaces in the keel. There is a passageway along the keel, from the point near the directional surfaces, aft, to the bow; up to the triangular bow framework (a veritable "stem") to a manhole on top of the envelope. Thence there is a walkway along the dorsal part of the envelope, to a position above the directive surfaces, aft.

There are six motors—12-cylinder Spas, V, 450 horsepower or a total of 2,700 horsepower. (This airship has a displacement of 1,100,000 cubic feet. The Zeppelin *L–70* launched in June, 1918, with a displacement of about 2,200,000 cubic feet had 7 Mayback motors, of 260 horsepower or a total of 1,820 horsepower or only two-thirds the power of the Italian airship, with twice the displacement. The Zeppelin achieved 65 knots. Later Zeppelins *L–71* and *L–72*, minutely examined by the armistice commission, had a displacement of 2,400,000 cubic feet, only 6 motors, totaling 1,560 horse-

power, with a speed of 61 knots. These last-named ships were not correctly stream lined). Running on only 2 motors, the Italians hope for a speed of 90 kilometers, about 55 miles or 45 knots, running on 6 motors, about 120 kilometers, or about 60 knots.

The motors are directly connected to wooden propellers, and both motors and propellers are placed outboard of the keel. The motors are inclosed in small stream-lined cars, reminiscent of the Zeppelin, which are reached by gangways from the keel.

Two of the motors are arranged for reversing the propellers, for use in landing. (Note: This is a very important feature, in large airships, much emphasized by German Zeppelin commanders, practical pilots.)

The fuel consumption is estimated at 100 kilograms (or 220 pounds), per motor per hour. The useful load is figured at 18 or 20 metric tons, of which 15 or 16 may be fuel. The maximum range and duration, therefore, running on two motors, and at 45 knots, would work out about 4,500 nautical miles in 100 hours, or nearly 9,000 kilometers.

Unless extraordinary success is had with this ship (and with its narrow keel, many things may happen) it is unlikely to attempt anything more ambitious than flight to England or possible Germany, where there are hangars and ground crews large enough to take it. At the best it would be spring 1920 before a trans-Atlantic flight could be attempted and then only if the United States or Canada possessed a proper hangar to receive such a large ship.

The altitude or horizontal rudders on this ship are in triplane form, but are similar in general arrangement to the systems in use on other Italian military airships.

Type "A" (12,500 cubic meters, 440,000 cubic feet, double car, 5 engines): Airship *No. 2* of this type (the only one existent) now at Ciampino, is to be modified for passenger carrying. A new car, model of which has been examined, is to be substituted for the present forward car. The new car is as large as a trolley car, seating 54 passengers besides the crew. Crew in this car and in after car. The new large car will be shifted somewhat abaft present position of forward car, to bring it more nearly under center of buoyancy. Actual work on this reconstruction is set aside for the moment on account of pressure of work on the "T 34." Type A airship is not thought much of by the Italians, and it is not improbable that this experiment will be without permanent value.

The *M–1*, a 12,500 cubic meter ship in the service of the navy, with station at Ciampino (this airship is now in its fifth car and fourth envelope, sentimental and accounting reasons preserving the original number, as an experimental ship), has received a two-deck car, of

clumsy form, with seats for 30 pasengers. She flew recently with 54 persons aboard, besides 1,300 pounds of fuel and several hundred pounds of ballast, drag ropes, etc.

For several weeks posters have appeared all over Rome, announcing aerial excursions in this ship. It is stated that the price of a ticket (possibly to Naples) will be 100 lire a head (at present rate of exchange, about $13) for a little over 100 miles air line, and that the public will be admitted to the flying field at Ciampino at 1 lira per head. But as yet nothing is forthcoming, and the more actively minded officers are disgusted with the stagnation.

In the meantime another ship of the same size, the *N–9*, is to be fitted with a passenger-carrying car of better form, but work of assembly has not as yet been begun.

The *PV–1*, a ship of 5,000 cubic meters displacement, of good form, and quite fast, with well-stiffened bow, has also been converted for passenger carrying. The car of this ship is a light wooden boat, about 30 feet long, with two 6-cylinder Spa motors on a tubular bridge or truss athwartmidships. Closed cabins have been provided before and abaft this truss, the after one providing seats for 6 passengers. These changes in the car have added about 200 pounds. A trial run on 17th of May carried 7 persons total for a couple of hours, plus 500 kilograms of fuel, 80 kilograms of oil, 100 kilograms of water ballast, and 9 bags of sand at 300 pounds. This lift is considered deficient, due largely to the rather robust construction of the ship. The *PV–1* recently flew from Rome to Milan, there to take part in an aeronautical exposition, which opened on the 29th of May, and is to remain open three months.

Airship *O–2* (3,600 cubic meters), with an old bag, is destined to be tried in an open-air mooring experiment. The ship is to proceed to a landing, dropping an anchor of grapnel form, which is to engage hawsers stretched along the ground and attached to rows of sand bags. All of this without the aid of a ground crew. Preparations had been made for this test, but the first favorable morning it was found that neighboring peasants had made off with the ropes, and there has been some delay putting through requisitions to replace.

Two airships, *O–8* and *Pb–4*, which were prepared in March for dispatch to Tripoli, are still at Ciampino. Hangars at Jesi, and near Civitavecchia, and at other places are closed, with only caretakers. The *M–6* is in working order, but apparently without a job. There is of course much aircraft material in stock—fabric, tubes, propellers, motors, cars, and parts manufactured in lots.

130990—19——2

ITALIAN AVIATION PROGRAM.

Source: Reliable.

6 June 1919.

(11741.)

Italian aviation authorities, including Gen. De Siebert and others, consider minimum annual appropriation necessary for a peace basis for army and navy aviation 200,000,000 lire. This figure pays for personnel expenses, repairs, and training, but not for experimental or new construction nor for replacements. Aircraft remaining on hand from war contracts is considered sufficient to last two years, without replacements, for the proposed peace organization. This appropriation does not cover civil or postal transport, either as to machines, grounds, or personnel. The present organization consists of about 5,000 officers and 20,000 men (army and navy). This assignment would be much reduced under the foregoing peace appropriation, which contemplates only "not falling behind but without making any further progress."

During the last year of the war Italian aviation forces counted about 5,000 officers and 100,000 men in the army, and 300 officers and estimated 10,000 men in the navy, with a total appropriation of 1,500,000,000 lire.

In order to continue experimental work and construction and to develop aeronautics on a moderate scale along lines indicated by present progress, the authorities feel that a much larger appropriation than 200,000,000 lire is necessary, especially for peace uses.

There are at present two conflicting tendencies: First to form a responsible and supreme air ministry somewhat on the British model, controlling construction, experiments, civil transport, training, and the assignment of machines and men to army and navy duty, as required; second to establish an undersecretary of the ministry of transport in charge of (1) air matters, construction, and civil transport, and (2) supplying aircraft to army and navy personnel, each of these branches to be under, respectively, a "direzione d'aviazione" and a "direzione d'aeronautica" which are under respective army and navy staffs much as at present. It is not now known which plan will prevail but the subject is being much agitated in the press, among manufacturers and among younger officers, who are much dissatisfied with the existing inactivity and indecision of the Government in aviation matters.

Proposed activities other than military and naval include postal services between the north and south of the peninsula, across the Appenines, across the Adriatic, with possible parachute distribution to Dalmatian Islands, across the Mediterranean to Sardinia, Sicily, and Tripoli and possible extension to Greece, Constantinople, and the

Syrian coast as part of an international service; also passenger service in large Capronis and dirigibles. First experiments are being made now. The institution of a trans-Atlantic passenger service is being considered via Spain and the West African coast to Brazil and South America, if air craft at present under construction are successful. The Government is also active in sending aircraft missions to countries where aeronautic development is an elementary stage, such as Argentina, with the object of interesting those Governments and peoples in the acquisition of Italian made aircraft, and the employment of Italian instructors. Many serious inquiries for the purchase of Italian aircraft and the services of instructors are being received from small South and Central American powers, from small European powers, some of whom have officers here in connection with purchases, and from China and Japan, the latter having in Italy a mission heretofore reported on of about a dozen officers who are acquiring a quantity of four different types of machines.

It is believed that this interest by nonmanufacturing powers is amply warranted by the technical excellence and performance of Italian motors, planes, and dirigibles compared with those of other great powers.

JAPANESE AIR SERVICE.

Source: Reliable.

12 June 1919.

(3439.)

The following is given as an estimate of the number and type of aeroplanes in the possession of the Japanese:

Two hundred Maurice-Farman biplanes, model 1914, slightly modified, two-seater pusher, equipped with 8-cylinder, 100-horsepower Japanese motor, or with 6-cylinder, 100-horsepower Daimler type motor, also made in Japan. Speed 70 miles per hour, landing speed about 35 miles per hour. The standard machine, both for instruction and service. An antiquated machine, which would be of no service in modern warfare.

One hundred standard biplanes, 150-horsepower Hall-Scott 8-cylinder motor, the plane that is used by the United States Post Office Department for delivering mail. This is a modern two or three passenger biplane, with a speed of 100 or 110 miles per hour. We consider this plane suitable for artillery observation and training work, but not fast or small enough for a fighter. The Japanese, however, evidently intend to use it for a combat machine. Only about 20 or 30 of these machines are assembled at present, but they are making

the nacelle and wings here, and have purchased 100 Hall-Scott motors from the United States.

Seventy-five Sopwith biplanes, both of the Camel and Pup type, equipped with 75 and 110 horsepower Le Rhone 9-cylinder rotary motors. These are the standard fighting planes of the British Army and were also used by the French. A very fine machine, light, with great maneuvering power, a speed of 110 to 120 miles per hour and a low landing speed of 40 miles per hour. About 15 of these machines were obtained from the French Government. They had been used during the war, and the new ones are completely equipped with instruments and even maps. The Japanese are building the nacelles and wings here and have sufficient Le Rhone motors to make up 75 machines. They evidently intend to adopt this machine as a standard. It is, perhaps, the best machine for this country, owing to its lightness and low landing speed.

Twenty-five Spads and Nieuports, secondhand machines obtained from the French, all having seen service on the western front. They are completely equipped. None of the Japanese aviators have as yet flown in these machines. It is believed they are simply for observation and their extremely high landing speed makes them practically useless for work in Japan.

As far as we know, the navy possesses 40 Maurice-Farman hydroaeroplanes. This machine is essentially the same as that described previously, having two pontoons or floats under the main planes. This is a very poor machine for sea work. It has a strong tendency to trip or nose down on landing, and owing to the pontoons, can not rise if the water is at all disturbed. It can not compare, as a seaplane, with modern machines now in use in Europe and America.

In addition, the navy has three balloons for observation purposes, and one aeroplane motor ship with a capacity of six machines.

ITALIAN SEAPLANE CARRIER.

Source: Reliable.

9 April 1919.

(4858.)

The Italian Navy has at present only one seaplane carrier, the *Europa*. The following description gives the fullest information on this vessel that has been obtainable.

The *Europa*, converted into a seaplane carrier and submarine mother ship, was originally a spar-deck steamer of 8,800 tons displacement and has been fitted for the service in which she is now engaged.

Characteristics.

Length, about 120 meters.
Draft, 5.86 meters.
Speed, a little more than 12 miles.

Arrangements for Seaplanes.

Two large sheds, one forward of and one abaft the mast and smokestacks (2), are each capable of housing four seaplanes with a wing spread of 23 meters. The forward ends of the sheds are closed by a fixed partition, and sliding curtains are hung at the sides. The openings are very large and the seaplanes can be taken out in any position.

In each shed there are four transverse rails for trucks which extend for 5 meters outboard and are equipped with tackles worked by a single capstan.

Benzine Supply.

The 50-ton benzine reservoir is placed in the bow and is equipped with a low pressure gas safety system of the *Bergomini* type for the feed supply.

Armament.

Two 76-millimeter antiaircraft guns, one on the bow and one on the stern.

Quarters.

Besides quarters for the commander and the second officer, there are 21 cabins for officers and accommodations for noncoms. Thus a numerous personnel may live aboard the ship.

AIRPLANE LANDING SIGNALS — AERONAUTIC INSTRUMENTS.

Source: Bureau of Standards.

17 July 1919.

(9802 B.)

Since August, 1918, the bureau has been experimenting on methods of signaling to airplanes to assist the pilot in determining the direction of the landing field, it being desirable to provide a system of signaling which will permit of safe landing in the dark or in dense fog. The arrangement is such that a magnetic disturbance is produced in a coil of wire wound on the lower wing of the airplane, setting up a very feeble current which is transformed into a telephone signal by means of a very sensitive amplifier. This signal is heard only when the pilot is near the landing field and its intensity

increases as he approaches the center. In experiments so far made, the signals have been audible up to heights of 5,000 feet. This system, when developed, will be of the greatest importance in enhancing the safety of aviation, as it will give the aviator a sense of security in the knowledge that no trouble will be encountered in locating a landing field, even under adverse weather conditions.

Aeronautic Instruments—Investigations.

The Bureau has had in progress for a considerable time an investigation of the properties and performance of the minute chains which are used in altimeters and aneroid barometers for the purpose of transferring the slight displacement of the diaphragm to the relatively large displacement of the pointer. These chains, the links of which are extremely small (0.06 inch center to center), wind about a drum and so serve to transmit a small movement into rotation of the pointer. Much of the accuracy and reliability of the instrument reading depends upon the smooth and regular action of this chain. At one time steel chains were used and it was found that much of the difficulty with altimeters in the aviation service arose from the unsatisfactory action of this type. The results of the investigation indicate the superiority of gold chains over the steel ones which have from time to time been employed. The importance of reliability in this instrument is appreciated when it is understood that the airman must depend upon it constantly for information vital to the safe navigation of his plane.

At the request of the Air Service, the bureau has converted two recording aneroid barometers of 5,000-foot range into 35,000-foot range, using a method of applying an additional external spring developed by the bureau and described in one of its war-time reports.

In connection with performance tests of aircraft, special dials have been prepared for a number of altimeters for the Navy Department and for the National Advisory Committee for Aeronautics, in order to make the instrument more suitable for the very precise readings requisite in that type of work. The investigations of diaphragms, which form the essential element of a considerable number of aeronautics and other engineering instruments, has been quite extensive, in the hope of developing information which would lead to elimination of certain errors to which all such instrument elements are subject, such as elastic after effect and elastic hysteresis. The latest results show the advantage of seasoning the diaphragm of the instrument by repeated stress application, which markedly reduces some of the errors referred to.

FRENCH NAVAL AERONAUTICS.

Source: Reliable.

28 June 1919.

(11789.)

The French Navy contemplates a request for a credit of 30,000,000 francs for aeronautics for the year 1920.

	Constructed.	Projected.
Squadron airplanes	30	72
Coast airplanes	0	30
Patrol seaplanes	1,000	0
High-seas seaplanes	3	16
Astra Torres dirigibles, 10,000 cubic meters	10	2
Zodiac dirigibles, 3,000 cubic meters	12	2
Zodiac dirigibles, 6,000 cubic meters	5	0
Chalais Meudon dirigibles, 5,500 cubic meters	4	0
Captive balloons, type P, 820 cubic meters	160	0
Captive balloons, type R, 1,000 cubic meters	14	20

All the projected machines are to be constructed during the year 1920.

Personnel.

Officers	209
Men, participating in flights	362
Men, specialists	1,009
Men, nonspecialists	2,074

TRANS-ATLANTIC FLIGHT OF VICKERS-VIMY MACHINE.

Source: Reliable.

21 July 1919.

(11905.)

The quantities of petrol, lubricating oil, and water consumed by Vickers Vimy during its recent trans-Atlantic flight were as follows:

Petrol, 550 gallons.

Oil, 24 gallons.

Water, no perceptible consumption. Water temperature never reached boiling point during entire trip, average temperature being approximately 80° C.

OPERATIONS.

THE CLEARANCE OF THE NORTHERN BARRAGE.

Source: Reliable.

1 June 1919.

(11878.)

Material.

Owing to the insulated wire being found unsuitable, 7-inch hawser was used instead. The sweeps were rigged as follows: 90 fathoms of 7-inch manila hawser, type VII plunger kite, 600 fathoms, of A.6 wire, half left and half right handed wire shackled together. The left-hand ship of the pair using left-handed wire, right-hand ship the right-handed wire. Dan buoys and sphereocylindrical buoys of 750 pounds buoyancy are being used. To increase the visibility of these dan buoys it is decided to try the attachment of small inflated balloons to them as a top mark.

The electrical protection device caused a deviation of 4½ points in the compass of one sweeper. The winch has three drums, each capable of carrying 2,000 fathoms, of A.6 wire.

Organization.

The 18 sweepers are organized in 3 divisions of 6 boats, with a commander in charge of each division. Each division is accompanied by 3 trawlers and 3 submarine chasers. The trawlers lay and weigh dan bouys and act as mark boats, the submarine chasers follow the sweep and sink mines.

The division commanders are not in command of the sweeper in which they embark. The commanding officers of these sweepers are promoted warrant officers of the United States Navy and their crews are active service ratings.

Methods.

Section V, consisting of 3 lines of mines, 66 miles long, was chosen on which to make a start. Each division had 22 miles to sweep. Each pair had about 7 miles to sweep.

The field was located by cross sweeping and dan buoys dropped 1 mile to the northward of the lines of mines. Each pair worked separately and tried to carry out a clearing sweep of his section of 7 miles by cross sweeping; ships of a pair working at 4 cables apart, their speed being about 6 or 7 knots. Explosions occurred in the 240-foot and 160-foot levels, the 45-foot mines being usually cut adrift. Mines were continually dragged in the sweep and as the

sweep parted every second crossing and possibly oftener, mines were dumped anything up to 1 mile on either side of their original position. On almost every occasion of the sweep parting mines were found foul of the kite or foul of the center fitting. On four occasions mines were hauled up close to the stern where they exploded, doing considerable damage. More than 50 per cent of the original number of mines planted have been found in this section. No upper level antennæ were observed and only one upper level mine was exploded by the *Oriole's* pair. Many lower level antennæ were seen. The type VII plunger by sounding tube was found to be keeping at a depth of over 40 fathoms with 90 fathoms of 7-inch manila out, which speaks volumes for its efficiency.

Remarks.

The wireless telephone which is installed in all these sweepers and submarine chasers is most efficient. These sweepers are flat bottomed and have no keel or bilge keels so that they have not a good grip on the water. They have a large overhanging fantail stern which in a slight seaway bumps heavily and shakes the whole ship, water is thrown about and makes it difficult for the officer aft to observe the sweep coming in. The loss of material in the few days was enormous amounting perhaps to 3 kites and 1,000 fathoms of wire by each of 18 sweepers.

RE AMERICANS SWEEPING FOUR CABLES APART AT SLOW SPEED.

NOTES BY D. M. S.

The large number of explosions in the sweep and in the kite that have been experienced by the United States mine-sweeping forces may be accounted for in the following manner:

(*a*) In the sweep, by the slow sweeping speed of the vessels.

(*b*) In the kite, by the large noneffective section of the sweep.

At slow speeds it has been definitely proved that there is a tendency for the sweep wire to slide up the mine moorings to the mine and that mines may be dragged a great distance, or exploded when they come in contact.

The effective breadth of the sweep, i. e., the distance between kites, depends upon the amount of sweep wire veered, decreasing as the length of the kite wire increases, as may be seen from the following data supplied by mining school:

Using a fixed length of 320 fathoms of sweep wire and with vessels two cables apart:

Percentage of effective breadth of sweep	Fathoms of kite wire used.
92.7	20
85.5	40
76.0	60
65.2	80

When the length of sweep was increased by the amount of kite wire used in each ship the following results were obtained:

Percentage of effective breadth of sweep	Fathoms of kite wire used.
94	20
90	40
87	60
84	80

To further increase the effective breadth of sweep the British sweepers have reduced the distance between vessels to $1\frac{1}{2}$ cables, and this taken on conjunction with their high sweeping speed and the use of serrated wire to increase the cutting efficiency had had the effect of eliminating explosions in the sweep. No serious cases of countermining have occurred since this system has been in force, although sweeping longitudinally and also across mine fields has been carried out.

To duplicate our conditions of sweep when vessels are sweeping at a distance of 800 yards apart and assuming that it requires 125 fathoms of kite wire to obtain a vertical depth of 40 fathoms, the United States sweepers would require to use considerably more than 1,000 fathoms of sweep wire.

Successful trials have been carried out at Grimsby and in the mining school with a T cutter placed some 4 feet from the kite with the idea of transforming the noneffective part of the sweep into an effective one. The idea might perhaps be equally useful to the United States forces.

A system of having one-half of the sweep right-handed wire and the other half left-handed has been introduced in the United States force, and is reported to obtain a much more regular depth of sweep than with the present system. Some difficulty appears to be occurring at the junction, however, which is liable to hang up the mines. Experiments are being made to overcome this.

NOTES ON CLEARANCE OF NORTHERN BARRAGE.

Source: Reliable.

1 July 1919.

(11878.)

During the latter portion of the month of May, the United States clearance force of mine sweepers, submarine chasers, and British trawlers completed the second sweeping operation of the three-line system of mines laid on October 13, 1918.

Out of the original 3,900 mines laid, 1,672 were destroyed as follows:

928 exploded by sweep.
747 cut adrift and sunk by rifle fire.
18 exploded after sweepers had left the field at the end of the day's work.

The clearance occupied 18 consecutive days' sweeping, and the total destroyed represents 43 per cent of the mines laid.

Numerous instances of countermining occurred, resulting in some instances in damage to vessels.

The sweep parted approximately 200 times, occasioning the loss of about 50 kites with a large quantity of sweep wire and other sweeping gear.

During June work was continued on the lines to the south of the British line R. Q. 2. Cross sweeping of the lines west of 1° 5′ west was undertaken before sweeping longitudinally. East of 1° 5′ west longitudinal sweeping was undertaken without previous crews sweeping with success and with no untoward circumstances.

The total number of mines originally laid was 5,520, of which 6 per cent exploded during the actual laying.

Between June 6 and June 18, 2,062 were swept up. The British forces in addition destroyed 61 during their clearance of R. Q. 2, and 25 were destroyed during the experimental sweeping by the United States forces. The total number of mines, therefore, accounted for to date is 2,148.

Four more sweepers are being fitted out at Kirkwall, and an additional 8 are expected to leave the United States at an early date to augment the forces at work.

It is considered unlikely at the present moment that the United States sweeping forces will be able to complete a clearance of the whole of the northern barrage by October 1, 1919, this being the date provisionally considered as the end of the mine-sweeping season in these waters.

The deeper level mines continue to be more in evidence than the surface ones.

MINES SALVED AND DEMOLISHED ON NORWEGIAN COAST, JANUARY 1–JUNE 1, 1919.

Source: Reliable.

1 July 1919.

(11878.)

Month.	District.			Total.
	Swedish frontier to Lindesnes.	Lindesnes to Utsire.	North of Utsire.	
January	340	164	146	650
February	25	42	489	556
March	11	25	393	429
April	18	22	224	264
May	29	21	108	158
Sum total	423	274	1,360	2,057

UNITED STATES TROOPS TRANSPORTED OVERSEAS.

Source: Reliable.

5 July 1919.

(9717.)

The War Department has just published a statistical summary of the war with Germany. It states that the number of soldiers sent to the other side was 2,086,000. The greatest number of men sent overseas in a single month was 306,000 and the largest number who have been returned home from Europe in a single month, at the time the report was completed, was 333,000. The supplies shipped from the United States to France amounted to 7,500,000 tons in the 19 months that the American forces were in action.

Most of the troops sent overseas sailed from New York, half of them landing in France and the other half in England. Of every 100 Americans sent overseas, 49 went in British, 45 in American, 3 in Italian, 2 in French, and 1 in Russian ships, the Russian ships being under British control.

The ports from which our troops were shipped and those at which they were landed in Europe are shown in the following table:

Ports of embarkation:	Number of men.
New York	1,656,000
Norfolk	288,000
Boston	46,000
Philadelphia	35,000
Montreal	34,000
Quebec	11,000
Portland	6,000
Halifax	5,000
Baltimore	4,000
St. John's	1,000
Total	2,086,000

Ports of arrival in Great Britain:	
Liverpool	844,000
London	62,000
Southampton	57,000
Glasgow	45,000
Bristol Ports	11,000
Manchester	4,000
Falmouth	1,000
Plymouth	1,000
Total	1,025,000

Ports of arrival in France:	
Brest	791,000
St. Nazaire	198,000
Bordeaux	50,000
Le Havre	13,000
La Pallice	4,000
Marseilles	1,000
Total	1,057,000

American cargo ships averaged one round trip every 70 days, and the troop ships one round trip every 35 days. The cargo fleet was almost exclusively American, and reached the size of 2,600,000 deadweight tons. The greatest of the troop carriers was the *Leviathan*, formerly the Hamburg-American liner *Vaterland*, which landed 12,000 men, or the equivalent of a German division, in France every month while the troop movements were approaching their maximum. The fastest of the troop ships were the Pacific liners *Great Northern* and *Northern Pacific*, which have made complete turn-arounds, taken on new troops and started back to Europe again in 19 days. In France American engineers built 83 new ship berths.

NAVAL OPERATIONS IN THE FINNISH GULF.

Source: Reliable.

26 June 1919.

(11740.)

The British naval forces in the Baltic, the greater part of which are in the Finnish Gulf, consisted on June 15 of three light cruisers, the *Gallatia*, the *Dragon*, and the *Cleopatra*, of about 3,600 tons each; 12 destroyers; and 3 submarines.

One submarine has been lost in operating off Kronstadt. It is thought the submarine struck a mine, but nothing is known of the details of the accident. All members of the crew are believed to have been lost.

In addition to the above there are a few auxiliary boats of various kinds necessary for the operations of the fleet described; also two small motor boats.

These motor boats are 45 feet long, fitted with V engines of 12 cylinders. The boats make a speed of from 38 to 43 knots; each is equipped with a torpedo tube, and carries a crew of three men.

During the night of June 20, one of these motor boats entered the waters around Kronstadt. The battle cruiser *Oleg* was discovered lying off the island, and was sunk by a torpedo from the motor boat at a distance of a thousand yards. The operation was a difficult one on account of the lack of darkness at this time of the year in these waters. The boat was under fire during this daring

and successful operation, but was saved on account of the lack of marksmanship of the Bolshevik gunners and on account of the speed of the motor boat. These two motor boats have entered the waters around Kronstadt a number of times, but have inflicted no loss on the Bolshevik fleet other than that referred to.

On Friday, June 15, after the fortress of Krasnaja-Gorka, on the Russian mainland, had been taken by the "Whites"—the Ingerman forces—operating in that neighborhood, considerable firing between this fortress and the forts on Kronstadt took place. Two Bolshevik trawlers were caught between the fire. One returned to Kronstadt, while the other, which happened to be commanded by an officer of not too strong Bolshevik tendencies, continued beyond the fire of the Kronstadt forts and surrendered to a British boat. The captain, before making his decision, asked the members of the crew what was their desire—whether to return to the Bolshevik forces or to escape and surrender to the English. The crew left the matter in the captain's hands. His boat was pursued by two Bolshevik gunboats, but he escaped and surrendered.

The above incident is cited, as it is believed that the attitude assumed by the crew of the Bolshevik trawler in surrendering is indicative of what would happen were the crews of other Bolshevik vessels to see clearly the failure of their cause and the defeat of their leaders. There is no liberty in the system of the Soviet government. The Bolsheviks preserve order in the country and discipline in their army and navy by force. The people of Soviet Russia submit on account of the consequences feared. What is true of the army and civil population is undoubtedly true of the naval forces.

A Bolshevik submarine is known to be operating between Kronstadt and the Russian mainland in the neighborhood of the fortress Krasnaja-Gorka which has been retaken by the Bolsheviks. The chief of the Finnish marine staff advises me that he believes this submarine is operating in those particular waters to prevent any boats of the Bolshevik fleet from escaping and surrendering to the British.

The British are using Bjorke, on the Finnish Gulf east of Viborg, as a base for their fleet operations. In addition to Bjorke, the ports of Reval and Helsingfors are also being used as bases in maintaining the blockade.

The Finnish marine has nine torpedo boats and other small craft at Bjorke operating with the British fleet in the Gulf of Finland. The boats are doing patrol work and mine sweeping.

BRITISH NAVAL ACTION IN THE FINNISH GULF.

Source: Reliable.

(11740.)

During the last few weeks there has been some long range firing between ships of the Bolshevik navy and ships of the British squadron now in the Finnish Gulf. Commander Grenfeld, the British naval attaché at Helsingfors, advised me that, as far as known, no ships on either side have been sunk or damaged. The Bolshevik ships have so far not attempted to come out beyond their mine fields.

In the last action, which occurred on June 1, a British destroyer was almost sunk by a Bolshevik airplane. The British destroyer, it seems, was taken by surprise and was not aware of the airplane's presence until it began dropping bombs from directly overhead.

I am advised by Commander Grenfeld that the British ships now in the neighborhood of Reval consists of 2 light cruisers of about 4,000 tons each, 12 destroyers, and 2 submarines.

THE GERMAN NAVAL FORCES.

Source: Reliable.

26 June 1919.

(11286.)

Situation of the Navy in April 1919.

Of all the forces constituted in Germany, the navy has been most disorganized by the armistice and the revolution. The surrender of the fleet and the mutiny of the crews produced such an impression on public opinion that the navy was the first to be discredited and neglected. But, now, and without awaiting the signing of peace, the German Government is manifestly endeavoring to provide for the future and reorganize at least groups of crews with a view to the future reconstruction of the fleet. Newspaper articles seek to raise the corps of naval officers in public opinion by endeavoring to prove that they had to show proof of considerable patriotism by accepting the order to accompany the battleships surrendered to England. It therefore appeared of interest to endeavor to extract from the rather contradictory information received, a general view of the situation of the German Navy during this transition period.

Navy Department.

The chief of the admiralty is Rear Admiral von Trotha (chief of the general staff during the Battle of Jutland). He is under the orders of the minister of national defense, has a seat at the ministry, but without right to vote.

Floating Matériel.

(*a*) *Submarines.*—The submarines remaining in Germany have to be taken to pieces. This clause appears to have been fairly well executed. The interallied boards report no attempt at fraud.

Surface Ships.

Scarcely any remain armed, except mine sweepers and their tenders, as well as, it appears, a large part of the destroyers and torpedo boats. These, however, are to land their ammunition. The torpedo boats are used as mine sweepers, escorts, or dispatch boats.

Personnel.

A great number of officers have already left the navy and each day the newspapers publish rather long lists of officers leaving the service. Officers having less than 10 years of service are retired without pension, and up to the present no indemnity has been granted them. They have obtained a leave of 3 months with pay to permit them to look for a profession. The naval authorities endeavor to find them situations in industry or elsewhere. A certain number have taken up agriculture. Many young officers have enlisted in volunteer formations, especially in the marine corps.

Crews.

The crews of mine sweepers are well paid volunteers. In several ports "Kustenwehr" and "Freiwillige Schutz Truppen" have been formed and are charged with maintaining order and without doubt, if required, the defense of the coast.

In addition, a naval division under the orders of Gen. von Lettow Vorback is being constituted. To this division belongs the Loewenfeldt naval brigade, whose service at present is especially on shore, but it is proposed to recruit crews in this brigade first upon the reconstruction of the fleet. That is why numerous young officers and midshipmen have enlisted in it and that endeavors are being made to attract specialists.

The chief preoccupation in the formation of these units is carefully to exclude all elements of disorder (spartacists and independent socialists) and to introduce sound discipline. Very good results appear to have been obtained from this point of view, and these naval units have proved particularly reliable during the repression of the recent troubles.

It is expected to be possible to complete three naval brigades.

Defense of the Coast.

The defense of the coast does not appear to have been completely abandoned. Heligoland is said to have been abandoned by its garrison. There remain only a few caretakers of the aviation center.

On the other hand, the batteries of Cuxhaven are still armed with some 20 heavy guns. At Danzig the forts have frequent practice at towed targets. It is said that new batteries are being constructed and that for the defense of this place field batteries and howitzers have been brought from the Silesian front. It is also said that Gen. von Bulow has assembled about 50,000 men at Danzig who present a very good appearance.

Aviation—Aeronautics.

An aviation corps for use outside the navy is now being constituted. It will be attached to the von Lettow Vorbeck division. In the aviation and dirigible stations the apparatus has nearly all been dismounted and is kept in good condition by detachments of volunteers who show, in general, considerable discipline.

Navy Yards—Construction.

New construction has nearly all been stopped. There are but few merchant ships on the stocks. The workmen are in part occupied in the taking down of submarines. Some yards are building locomotives. The torpedo works at Friederichsort are engaged in the repair of fishing boats and the manufacture of furniture and plumbing material. The workmen in the navy yards especially are continuing to receive their salaries, though without occupation. The salary per hour for a qualified workman is 2.50 marks per seven-hour day.

Situation of Warships in April, 1919.

Danzig.

Former battleships: Zahringen, guns on board, out of commission; *Worth*, *Brandenburg*, hulks, no guns, no funnels.

Coast defense vessels: Hagen, *Hildebrand*, hulks, no armor or guns. *Beowolf*, guns on board, fitted as ice breaker, ready to proceed to sea in 15 days.

Old cruisers: Stettin (camouflaged), *Danzig*, *Kaiserin Augusta*, *Nautilus* (mine layer), out of commission, guns on board. *Victoria Louise*, no guns; *Grefion*, hull.

Torpedo boats: T–21, 79 unserviceable, too small. *T–91*, *97*, *101*, *104*, *105*, *106*, *114*, *147*, being transformed to mine sweepers.

Mine sweepers: FM–14, 34 ready for service, but not yet commissioned.

Kiel.

Battleships: Rheinland, dismantled, armor removed; *Westphalen*, *Oldenburg*, *Helgoland*.

Old battleships: Braunschweig, base ship for mine sweepers. *Elsass*, *Hanover*, *K. Friedrich III*, *K. Wilhelm der Grosse*, *Meklemburg*,

Schlesien, *Schleswig-Holstein*, *Hessen*, *Baden* (ex), *Acheron*, *Uranus*, *Mars*, fitted as schools or hulks, out of commission, guns removed.

Old cruisers: Roon, *Furst Bismark*, *Prinz Heinrich*.

Light cruisers: Strasburg, guns removed, being fitted as tenders for mine sweepers, *Stralsund*, *Augsburg*, *Kulberg*, *Stuttgart*, *Berlin*, *Munchen*.

Old light cruisers: Amazone, *Hansa*, *Lubeck*, *Nymphe*, *Thetis*, *Hertha*, *Freya*, *Medusa*, *Vencta*.

Mine layers: Albatross, *Hertha*, *Odin*, *Hochland*(?), auxiliary ships, 1,200-ton passenger ships, out of commission.

Gunboats: Twelve, including *Condor*, mine depot, *Hyena* and *Triton*, employed in replacing buoys, etc.; *Pelikan*, school ship for mines: *Nordsee*, tender.

Destroyers: S–19, *24*, *135*, *H–147*, *B–97*, *98*, *V–105*, *106*, *108*, and 50 Ts, of which the numbers are comprised between *T–94* and *T–195;* 53 torpedo boats of series A, D, and T, in service or being transformed to mine sweepers.

Mine sweepers: M–60, *FM–1*, *2*, *4*, *20*, and *25*.

Wilhelmshaven.

Battleships: Nassau, *Ostfriesland*, *Posen*, *Thuringen*, guns on board, out of commission.

Old battleships: Deutschland, guns removed, base ship for flotilla; *Lothringen*, *Preussen*, seagoing base ships for type F motor mine sweepers; they have a superstructure for housing 12 of these vessels; guns removed; *Schwaben*, 4–15 still in place, sold; *Wettin*, hospital ship for mine sweepers, guns removed; *Wettlesbach*, base ship for mine sweepers, guns removed; *K. Barbarossa*, *K. Karl der Grosse*, hulls, armor removed; *K. Wilhelm II*, hull, headquarters of Commodore Harder, commandant of defense forces of North Sea.

Old coast protection ships: Odin, base ship for mine sweepers; *Aegin*, *Heindall*, *Siegreied*, hulls.

Light cruisers: Konigsberg, *Pillau*, guns and torpedo tubes removed; armor belt removed; *Grandenz*, in bassin, guns on board, out of commission; *Regensburg*, guns on board, out of commission, postal service with Scapa Flow; *Hamburg*, guns on board, out of commission; *Arcona*, guns removed, seagoing depot for mine sweepers, *Niobe*, guns removed, out of commission.

Gunboats: Six, including *Primula*, transformed passenger ship, attached to mine-sweeper flotilla.

Destroyers: H–146, *S–139*, *135*, *134*, *133*, *V–138*, *G–95*, *V–79*, *S–63*, *V–28*, *26*, *G–11*, *10*, *8*, *7*, *V–6*, *5*, *3*, *2*, *1*, *T–197*, *198*, *144*, *183*, *182*, *178*, *176*, *144*, *139*, *148*, *142*, *137*, *135*, *113*, *98*, *96;* 43 type A and I torpedo boats; the latest of these torpedo boats are used as escorts. The

oldest destroyers and new torpedo boats are used as mine sweepers. The old torpedo boats are used as dispatch boats.

Mine sweepers: Sixty-nine, of light draft: have a coal supply too limited for operating far from the coast; are considered as failures.

Vedettes: Eighteen with U–2 motors, and 14 with F motors.

Ships in Construction.

District of Danzig.

SCHICHAU.

Battle cruisers: Graf Spee, half of armor in place, turret armor in place, boilers on board, work stopped at 18 months.

Torpedo boats: S–152 to 157 (6) launched, in different degrees of completion; *S–178 to 189* (3), on the ways; these ships are said to be 10 meters longer and 3 meters more beam than the preceding.

GLANTZER (?).

Mine sweepers, two, being transformed to commercial vessels.

ELBING.

Large destroyers, cruiser torpedo boats: S–114, 115, launched; bridges, superstructures, and funnels in place.

KIEL. NAVY YARD.

Battleship: Sachsen, launched, turrets 2 and 3 in place with their guns, amor belt, and funnel in place.

Destroyers: W–116, S–113, launched, completing.

Light cruisers: Frauenlob, hull only, launched, work stopped. Name unknown, on ways, one-quarter constructed.

GERMANIA WERFT.

Destroyers: G–119, launched and superstructure in place, work stopped; *G–120, 121*, on ways, work stopped.

HOWALDT.

Light cruiser: Magdeburg, launched, part of engines only in place, work stopped.

Destroyers: H–163, 169, launched, work stopped; *H–166, 167, 180, 187*, on ways, work stopped.

HAMBURG—BLOHM AND VOSS.

Battle cruisers: Mackensen, launched, hull only, with part of armor belt; *Ersatz Frega*, on ways, work being continued to permit of launching probably in October.

Large destroyers: B–122, 123, launched, hull only; *B–124*, on ways, three-quarters ready for launching, little work proceeding.

VULKAN.

Battleships: Wurtemburg, to be used as base ship for mine sweepers in Baltic, hull launched with armor; *Salamis*, hull launched with armor and part of superstructures.

BREMEN. BREMER NESER WERFTE.

Leipiz, launched, hull only, *Ersatz-Koln*, *Ersatz-Emden*, on ways nearly ready for launching; work being continued on one of these. Upon inquiry as to whether this was with a view to launching, it was stated that it was only to keep the men employed.

WILHELMSHAVEN.

Battle cruisers: Prinz Eitel Friedrich (Ersatz A), construction stopped.

Mine sweeper: One, work in progress.

JAPANESE NAVAL FORCES FOR SUMMER MANEUVERS 1919.

Source: Reliable.

11 June 1919.

(11861.)

THE ORGANIZATION OF A COMBINED SQUADRON FOR THE PURPOSE OF EDUCATION AND DRILL.

The organization of "Combined Squadron" was announced on June 1, 1919, by the Imperial Japanese Navy Department.

The "Combined Squadrons," as noted above, will hold maneuvers throughout this summer. These maneuvers will terminate before fall.

Admiral Gentaro Yamashita has been appointed commander in chief of both the First and the "Combined Squadrons."

FIRST SQUADRON.

First Division.

Yamashiro (flagship).
Ine.
Hyuga.

Second Division (Vice Admiral Moriyama).

Settsu (flagship).
Kajima.
Satsuma.

(The above are six battleships.)

First Torpedo-Boat Division. (Rear Admiral Nakajima.)

Tatsuta (second-class cruiser) (flagship).

Fourth Destroyer Flotilla.

Keyaki.
Kuwa.
Tsubaki.
Maki.

FIRST SQUADRON—Continued.

THIRTY-SECOND DESTROYER FLOTILLA.

Yamakaze.
Umikaze.
Nara.
Enoki.

FIRST SUBMARINE DIVISION. (Rear Admiral Sugano.)

Aso (first-class cruiser) (flagship).
Thirteenth Submarine Division.
Komabashi (depot ship).
The *Eighth* submarine ship.
The *Ninth* submarine ship.
The *Fifteenth* submarine ship.
The *Sixteenth* submarine ship.
The *Seventeenth* submarine ship.

THE SECOND SQUADRON.

THIRD DIVISION. (Vice Admiral Yamaya.)

Haruna (flagship).
Hiei.
Kirishima.

(The above are three battle cruisers.)

SECOND TORPEDO DIVISION. (Rear Admiral Kamadani.)

Hirato (second-class cruiser) (flagship).
First Destroyer Flotilla:
Isokaze.
Yamakaze.
Amatsukaze.
Third Destroyer Flotilla:
Tanikaze.
Ekaze.

THIRD SQUADRON. (Vice Admiral Kuroki.)

Kurama (flagship).
Ibuki.

(The above are two battle cruisers.)

(The *Mikasa* of the Fifth Division is on detached duty at Vladivostok.)

JAPANESE DESTROYERS LAUNCHED.

Source: Reliable.

19 June 1919.

(11860.)

The *Momi* and *Kaya*, 835-ton destroyers, built at Yokosuka, were launched on June 10, 1919.

Battery: Four 4-inch guns.

Torpedo tubes: Three triple barreled.

Both boilers and turbine engines were made at Yokosuka Navy Yard.

Speed: Thirty-one knots; oil burning.

GERMAN NAVAL LOSSES.

Source: Article from London Times.

30 May 1919.

(5373.)

199 SUBMARINES ADMITTED.

A wireless message gives what purports to be the total of German naval losses suffered during the war. They are as follows:

Ship of the line	1
Battle cruiser	1
Old armored cruisers	6
Modern cruisers	3
Old small cruisers	10
Gunboats	7
River gunboats	3
Destroyers	39
Large torpedo boats	21
Small torpedo boats	41
Mine sweepers	28
Auxiliary cruisers	9
Fishing vessels, luggers, etc	122
U-boats	199

Eighty-two submarines went down in the North Sea and the Atlantic; 3 in the Baltic; 72 in Flanders; 16 in the Mediterranean; and 5 in the Black Sea. Fourteen were blown up by their own crews and 7 were interned in neutral ports.

The losses of men killed in the naval services are given as—

Fleet: 946 officers, 5,222 deck officers and noncommissioned officers, and 12,686 men.

Marine corps: 328 officers, 1,488 deck officers and noncommissioned officers, and 8,809 men.

There fell in Tsingtau 10 officers, 33 port noncommissioned officers, and 163 men.

INTERNATIONAL CONDITIONS.

MEXICAN CONDITIONS.

Source: Reliable.

26 July 1919.

(11714.)

Notes.

Mormon colonists in Chihuahua report that there never has been a better prospect for crops and perhaps never has a greater acreage of wheat been planted.

Since the improvement of transportation facilities, the petroleum industry has had a great boom. During the last three months more than 70 new wells have been bored in the Tampico region. The boom indicates that all that was lacking to develop the industry was transportation. Many ships which had been diverted to war uses have now been returned to this trade. During the first two months of the present war the exportation amounted to 1,580,913,580 tons, bringing in a revenue of $2,131,452.84 oro nacional.

It is rumored that the Mexican Government is contemplating taking over the National Railways entirely, to negotiate which Señor Fernando Gonzales Roa will shortly leave for the United States. This trip will be for the purpose of making arrangements regarding payment of indemnities, interest, and mortgages which have not been paid since 1914, and which amount to 93,000,000 pesos. The railways of the southeast have appointed a commercial agent for Central and South America, who will leave immediately for Salvador, where he will solicit that the National Tehauntepec Railway will be used for the interoceanic transportation of that State.

The Chamber of Commerce and the press of Eagle Pass, Tex., are making a very active campaign toward the establishment of daily Pullman service with Piedras Negras, Monterey, Saltillo, Torreon, and Mexico City.

Puerto Angel, in the State of Oaxaca, has been reopened upon the recommendation of the department of communications and public works. This port was closed about four months ago, as it was known that rebels had been receiving ammunition through that place.

The port of Tampico is in very great danger of being entirely inundated. Many poor families who have built wooden houses on

the dry banks of the Tamesin River are homeless, having lost everything.

On July 2 a delegate of the health department left Mexico City for Sinaloa, equipped to fight the epidemic of smallpox which has appeared in that State. As the disease is spreading rapidly, a quarantine has been decreed.

Yellow fever has appeared in Yucatan according to report of July 12.

New Orleans and Habana maintain yellow fever quarantine against Yucatan. The Yucatecos refuse to have it stamped out, relying upon it as their "first line of defense" against invasion. It is usually confined to Merida and vicinity.

Gov. Calles, of Sonora, continues his bitter war for the enforcement of prohibition in his State.

At a private meeting recently of the Partido Liberal Constitutionalista at the home of Gen. Hill, it was resolved to inform Gen. Obregon that he must either accept the platform adopted by said party or they will not support him and will either disband or choose another candidate.

A Socialist congress was planned to be held in the Federal District during the middle of July.

There have recently been anti-Chinese riots in Mazatlan and Culiacan, in consequence of which the Chinese minister has appealed to the department of foreign relations for guaranties for the citizens of his country.

The strike which took place in Tampico in the middle of June has been traced to Bolsheviki propaganda. In opposing the riotous strikers who were determined to bring on a general strike in the port, Maj. Cuadra, chief of the military police, was killed by one of the strikers. Gen. Ricardo Gonzalez, head of the Tampico garrison, with 50 of his men, finally succeeded in restoring order. Five strikers and an officer and two men were wounded.

The entire Federal force in Yucatan is only 450 men.

There was an uprising of 300 to 400 radical Socialists about two weeks ago at Muna, which was severely repressed by Gen. Hernandez, who deported 42 of the survivors, without trial, for military service in northern Mexico.

A plan is being considered by the department of war for reorganizing the military districts of the Republic. The proposed plan contemplates eight districts as follows: Sonora, Sinaloa, and Lower California; Chihuahua, Durango, and the Laguna District in Coahuila; Tamaulipas, Coahuila, and Nuevo Leon, including northern part of San Luis Potosi; Zacatecas, San Luis Potosi, and Queretaro; Veracruz; Guerroro, Morelos, and Oaxaca; Chiapas and Tabasco; and Yu-

catan and Campeche. The headquarters of each district to be wherever the department of war may direct.

Preparations are under way for the establishment of a military college to take the place of the present "Estrada Mayor." Pupils at present attending the latter college will be transferred to the new institution. The faculty of the new college is to be very select. The new curriculum is to be brief and intensive.

A party of majors and captains have been sent to Chiapas by the department of war to organize "Defense Societies" to work in cooperation with Gen. Alejo Gonzalez.

There are indications that Cantu will leave Mexicali within a week, not for Ensenda as is his usual custom, but for Tia Juana; that is to say, for San Diego. An office at Tia Juana is simply an excuse for living on the American side of the line in San Diego.

A conference of Cantu's military chiefs decided to support Carranza. This action was taken after the incident at Juarez.

The army of Cantu is probably six or eight hundred strong, over half of the force being at Mexicali; and for a Mexican army bears the reputation of being singularly efficient.

Americans reaching Nogales, Ariz, from the Interior of Sonora, state that numerous bands of Mexican soldiers commanded by Federal officers are confiscating horses and mules in many districts of Sonora. One American who was forced to make his contribution of this sort learned from the Federal major in charge of the confiscating party that the military authorities plan to obtain 1,500 animals throughout the State in this way for use in extensive compaigning against Villa in Chihuahua. This particular officer dealt harshly with the Americans, and in several instances threatened them with death unless the live stock were given over to him immediately.

Approximately 100 men have been added to the Mexican Federal force of Fiscal Guards stationed in and about Nogales, Sonora. Patrols have been increased from that point east and west along the international line for the especial purpose of apprehending thieves, who have lately shown increased zeal in driving cattle stolen in the United States across into Mexico. These patrols are under Col. Comargo, the Nogales military commander, who, although he has small love for Americans, is a fearless man and anxious to enforce law and order.

Yaqui leaders in the vicinity of the border have of late been repeatedly pointing out that, since the transfer to Agua Prieta and Cananea of several hundred Federal troops from Yaqui Valley posts fewer outrages have been committed against American and other inhabitants of the Yaqui region. These leaders staunchly deny that their people have been guilty of the recent attacks on Americans, with which they have been charged.

Mexican ports along the western coast are controlled by Federals, but the rebels practically control the country a few miles back. This is particularly true from Colima to Oaxaca and about Mazatlan. The rebels are said to have new American arms.

West coast railways are operating a daylight service over about 750 miles from Nogales to Acaponeta. Small, unguarded stations are sometimes looted and burned by outlaw bands of 10 or 20 men. Most of the disturbances occur southeast of Guaymas.

Palez seems to quiet for the nonce.

An ex-captain of the Pelaecistas says that Pelaez has not been getting his ammunition from the petroleum companies, but from small merchants in Tampico, who purchased cartridges from the soldiers and sent them to the rebels in petroleum cans and flour sacks, and from families who have left with the rebels when towns have been burned. About 500 cartridges were sent a week from the Puebla and Veracruz region by herdsmen who would go to the coast and exchange a mule for 400 or 500 cartridges and often buy fire-arms for 15 or 20 pesos. The informant intimated that there must be some distributing center in the mountains of Puebla, as the Marquez brothers and the Indians always had considerable quantities of ammunition hidden away.

However, he stated, as the Government's vigilance had made this practice difficult, a new system is adopted. Families of the rebels establish little luncheon pavilions near the Federal troop encampments, charging exorbitant prices for their wares and offering to accept the equivalent in cartridges. At present the rebel supply of ammunition is said to be so scarce that only five cartridges are allowed to each rebel and the reserve quantity is reported to be not greater than about 2,000 rounds of ammunition.

The Felicistas are apparently mustering their resources with a view to something big. Mendoza, the Felicista, with a large sum of money, left Laredo for Brownsville June 24, and was expected to cross into Mexico.

Rebels continue active in Michoacan, as evidenced by the entrance into Apatzingan, Michoacan, of El Costeno and Salvador Alvarez, who, after sacking the town, carried off three well-to-do citizens of Paracuaro from whom they demanded a total ransom of 50,000 pesos. Cases of this sort are becoming quite common.

Rebels who have been harrying the States of Jalisco and Nayarit, being hard pressed in those regions by the Federals, went into Colima and attacked and burned the daily passenger train from Colima to Manzanillo.

A prominent Englishman who lives near Forlon in Tamaulipas, has informed the United States authorities that the railway station at Forlon was recently burned by bandits, that another large

band entered the city of Victoria, shot several policemen and seized a considerable supply of ammunition, and that another band operating near his place is reported to have killed an American and carried off his wife. In general, conditions in that part of the country are steadily growing worse and all Americans in country places are leaving for places of safety.

Rebels have taken Minatitlan, Veracruz, with the result that traffic on the Tehauntepec national railway has been suspended between Santa Lucrecia and Puerto Mexico.

The widow of Juan Echegaray, of Mazatlan, who recently started a revolt and was overtaken by Carranza troops and killed, has stated that her husband had a commission from Gen. Francisco Villa. She said that he had been in constant communication with Villa sympathizers in Los Angeles, Calif., and other points in the United States, and that he had been able to get together a considerable amount of arms and ammunition. He was confident that he would be able to organize a force in the State of Sinaloa which would be sufficient to hold out against the local troops and probably take all the west coast and join Villa across the mountains.

Echegaray was at one time a major in the Carranza army, but for some reason or another became estranged, and was ever after opposed to the Carranza government. He started his revolt in Sinaloa about the time that Villa attacked Juarez.

Despite rumors of Villa bands in eastern Sonora, American mining men who keep in close touch with conditions in that section declare that the Villistas have not gone farther west than Carretas in the far western part of Chihuahua, about 60 miles south of the international line.

Airplanes have dropped bombs with effect on Villistas operating on the Northwestern Railroad, dispersing them. Villa was seen at Pilar Conchas on July 4, and with Angeles occupied Parral on the 5th of July. All Americans left Parral the first week in July, after the Carranzista commander at Jimenez had seized their horses. The Mexican Government has refused to send an adequate force of troops to that place. Officials in that vicinity have notified Americans to use their own judgment, but prisoners have advised them to leave at once. Mapimi (in Durango), about 100 miles from Parral, is guarded by less than 70 Government troops. There are 66 Americans there. The troops have advised the Americans that they can not promise protection in case Villa attacks.

On July 5 Gen. Dieguez went south from Chihuahua City with 2,000 men and several planes. Other troops had preceded him, and Gen. Munoc on July 6 was marching from Jimenez to Parral. The indications are that the campaign against the Villistas will draw to a head in the vicinity of Parral.

Latest reports declare that Villa is hiding with a remnant of his troops in the hills north of Parral; that he only occupied Parral temporarily; that Federal cavalry are scouting in all directions from Chihuahua City after the scattered Villistas.

But Gen. Arranda is believed to have collected as many as 1,000 Villistas about him at his smuggling rendezvous in northeastern Chihuahua.

On July 5 an astonishing report reached the border to the effect that Villa had relinquished his command to Angeles. On the other hand, the Mexico City papers announced that Villa had ordered Angeles shot after the Juarez episode; that Angeles, however, escaped to Texas.

As usual, Villa has us guessing. The Villistas are or are not dispersed. There will or will not be a concentration of Villistas at Parral.

If, as is reported, most of the damage done by the Villistas to railroads and telegraph lines has been repaired, either reports of damage were exaggerated or the Mexicans are not so inefficient.

FROM THE PRESS.

Peter Catron, an American citizen, is reported to have been killed by Mexican bandits about July 7 in the State of San Luis Potosi.

The newly formed National Association for the Protection of American Rights in Mexico is very active.

CONDITIONS AT HAMBURG.

Source: Reliable.

26–29 June 1919.

(10894[b].)

26 June 1919.—During the afternoon of 26 June visited the Seamen Hospital and saw there a large number of wounded from the rioting; the authorities at hospital stated that 30 had died.

Conditions remained quiet throughout the day. From reliable sources there were 20,000 Government troops in the near vicinity of Hamburg. Apparently there was no intention of bringing these troops into town. The knowledge that these troops were in the near vicinity had a salutary effect in that it brought various conflicting parties into an agreement as to the necessity of preserving order. The majority of the populace was in favor of law and order. A small element of radicals, anarchists, and Bolshevists, as usual, was for confiscating all property and material wealth. All indications at this time were that quiet and order would be preserved.

27 June 1919.—The city remained quiet during the night of 26–27 June. It was confirmed that approximately 20,000 Government troops were surrounding the city.

A number of posters or proclamations were posted about the city. About 10 a. m. 11 German destroyers flying the naval flag came up the river and berthed at different docks. It was found that they had come from Wilhelmshaven and each had on board, in addition to the crew, about 80 soldiers.

Whether or not quiet would continue depended largely on whether or not the populace would turn in their arms as ordered. It was considered that the crisis would be passed by the morning of 28 June.

During the afternoon a German seaplane flew around the harbor. It was a monoplane with machine gun and operator mounted abaft the pilot, and so arranged as to command a wide arc of fire. It appeared small and fast and of the fighting type.

During the day the local seamen's hospital was inspected. The head doctor impressed me as being very thorough, and the hospital excellent in all respects.

There were some 30 cases in the hospital of people injured in the recent fighting and about 30 others have died as a result of injuries.

28 June 1919.—The day passed quietly. To all appearances everything was normal. The Government troops had withdrawn to the outskirts of the city. The knowledge that they were in the immediate vicinity influenced all parties to unite in insisting upon order being maintained. What attitude will be maintained if the troops are entirely withdrawn is problematical. It is believed, however, that no more disturbances are likely to occur. At no time was the work of unloading vessels delayed.

29 June 1919.—The day passed quietly. Nothing to report.

CONDITIONS IN HAMBURG.

Source: Translation from a Newspaper of Hamburg.

(10894[b].)

27 June 1919.

Yesterday was a quiet day. The National Guard was reinforced by detachments of the organized workmen, and groups of four men with red armlets patrolled the town.

An attempt was made by about 26 persons, partly civilians, partly in uniform, to enter the prison and penitentiary house at Fuhlsbuttel, but the armed aggressors eventually withdrew, leaving behind them a few unarmed men for reconnoitering purposes.

In spite of reinforced patrols numerous gangs looted villas in Harvestehude, Rotherbaum, and Uhlenhorst, and extorted money, valuables, and victuals from the owners.

Two members of the Schwerin Workmen Council at a meeting here stated that the Hamburg Senate had asked for Government

troops which, after lengthy discussions, was admitted by three members of the Senate, the reason for this step being the insecurity that must prevail owing to the prisons having been stormed. The Schwerin railway men had refused to forward the troops, but when told that Social Democrats formed part of the Senate they took up their work. From Neumuenster troops are also said to be on the way and the workmen at Neumuenster were going to strike until the troops had returned to Neumuenster.

Cremer (I believe the colonel commanding the troops at Wandsbek?) has parleyed with Lamp'l and heard that torpedo boats with over 1,000 men were on the way to Hamburg, but these boats had for the present anchored off Brunsbuttel. Negotiations have also been going on with Berlin and the disarmament of the ragamuffins as well as the reimprisonment of the freed prisoners was insisted upon as otherwise Government troops would enter. The Inhabitants Guard will be reorganized. Schiller declared that the arming commission had done practically nothing during the last 24 hours. As to disarming, nothing had been done. In the park of the Stadtgraben trenches had already been dug and machine guns put up. These scandalous conditions must cease immediately. The Kriegsversorgungsamt (food office) should be completely reorganized and the food supply regulated.

Laufenberg concurred with Schiller in demanding immediate disarmament of those having come into possession of arms unlawfully and if necessary a house-to-house search for arms and hand grenades had to be made. His party had always been against the use of arms, the strength of the workmen lay in their economical importance. If the people were not disarmed the Government troops would enter and there the shady elements would offer them armed resistance. The troops would attack and incalculable misery would result. At the conclusion a resolution was carried not to oppose armed resistance to the Government troops if they entered.

ESTIMATE OF THE POLITICAL SITUATION OF THE WORLD.

Source: Reliable.

21 July 1919.

(11403A.)

From the psychologic estimate we see that the present dominant urge of the world is sociologic in character, having three phases—autocracy, liberalism, and proletarianism.

The political situation is a composite of these three movements as affected by "interests" and ethnic influences. A study of the situa-

tion shows the connection between the Proletarian "Left" and the Autocratic "Right" in their common antagonism to the Liberal "Center." It shows the interrelations of the German-Bolshevist-Jewish liaison. It shows the two strong groups composing the "Center"—the Anglo-Saxon-aviation capital group and the French-small nations-reactionary group; and finally it shows all of these groups as intimately related to commerce and capital, and through these two, to Russian Siberia, that great coming field of commercial opportunity.

For the immediate future liberalism can hold its own against the organized efforts of the German-Bolshevist-Jewish group only if it remains organized and alert. Its war organization in the form of Allied cooperation is ceasing and will pass wholly unless superseded by the League of Nations. The reactionary elements in the Liberal group, particularly the "French-small nations group," Autocratic Japan, German, and Bolshevist hostilities, and the ethnic interests of Jewry will combine to prevent the continuation of the organized unity of the Allies and liberalism. These elements feel that if the League of Nations is established the hope of accomplishing world dominion either for autocracy or proletarianism will be lost. If, however, they do lose on this line, there is evidence to show that they are already preparing to create combinations within the bounds of the league whereby they hope to ultimately dominate and control its action and policy.

Should liberalism fail in its efforts to organize the world, then either the Autocratic or Proletarian group will succeed, for a world directorate of some kind is inevitable.

Through recent defeat and because of the current psychologic attitude of the mass of the people of the world, autocracy can not hope at the moment to gain her objective directly, but she can and does intrigue with the Proletarin group, aiding and abetting them, hoping in the process of time to dominate and control the group, knowing that if she does not she will be devoured. Through and around the struggle is Jewry, playing both ends against the middle for the benefit of her ethnic interests.

RUSSIAN CONFLICT WITH THE BOLSHEVIKI.

Source: Reliable.

25 June 1919.

(11523.)

Official telegrams from Omsk advise that the Red troops after the defeat at Glasnov are retreating on the entire front between the railroad north of Perm and the Kasan district. At Sobeleff, 80

kilometers south of Buzuluk, the Ural Cossacks have split the Bolshevik army and taken 20,000 prisoners, together with a great war booty.

It is at the same time advised from Paris that Deniken's offensive is conducted highly satisfactorily. The whole of the Donetz coal district is conquered.

It is telegraphed from Helsingfors that the Bolsheviks allow that the fall of Gdov, Jamburg, and Pskoff is due to treason on the part of the troop commanders and that the common soldier was not alone in betraying the Bolshevik cause. Not even the Kronstadt garrison can longer be depended upon. When the Kronstadt artillery and fleet bombarded Krasnaja-Gorka, the majority of the shells did not hit the forts, but fell in the outskirts of the city, where they caused a few fires, but the forts themselves remained undamaged through the bombardment. In most instances the Bolsheviks did not aim at the forts, but directed the fire toward the Finnish coast.

CONDITIONS IN ITALY.

Source: Reliable.

27 June 1919.

(9270S.)

The Congress of the Associazione Nazionale dei Combattenti (Soldiers' League) is continuing in session at Rome. Latest reports indicate that its membership is increasing rapidly and it is becoming a real force in the country. It is estimated that it includes over 600,000 to-day of the more intelligent, aggressive, and younger soldiers and officers. It is said to have gained the sympathies of a large number of malcontents among the intelligensia. Originally designed to combat the growth of socialism in Italy, the Soldiers' League now finds itself strong enough to dictate the political policy. It is insistently rumored that this association and other less conspicuous allied movements are working with a view to establishing a military dictatorship along radical lines, in case the Government is unwilling or unable to bring about the much-needed economic and social reforms.

The Epoca reports that the local military authorities at Novara discovered a considerable mass of revolutionary propaganda which had been distributed among the troops of the garrison there. Seventy-three soldiers found in possession of this subversive propaganda were put under arrest.

It is reported that the classes of 1889–90 and 1891 are about to be demobilized. It is urged that the demobilization of the army be accelerated in view of the fact that it is proposed to hold a general

election early in the autumn. Moreover, in order to prevent unemployment, which is increasing, it is urged that the demobilization shall not be hastened unduly, so as not to cause further internal complications.

The press reports that as a result of the concentration of the Hungarian Red forces, apparently with a view to invading German Austria, Vienna will be occupied by detachments of Italian and French troops. This information should be accepted with reserve.

The press reports serious disorders as a result of the occupation of the Smyrna-Aidin region by the Greeks. It is alleged that these disorders are assuming considerable proportions and the opposition of the Turks to foreign occupation is spreading.

The Giornale d' Italia states that with a view to quelling the local disturbances on several occasions Italian troops have been called upon to intervene, as the Italian troops, it is claimed, are the only ones in this region which have been well received by the people.

130990—19——4

MISCELLANEOUS.

PORT OF ARCHANGEL, RUSSIA.

Source: Reliable.

28 November 1918.

(11896.)

Erroneous Impressions Regarding the Port.

The usual impression regarding the port of Archangel is that it is a port of comparatively little importance, closed most of the year by ice, and with insufficient means of distribution by inland transportation.

City of Archangel.

The city of Archangel has increased in population from 35,500 in 1914 to an estimated population at the present time of from 90,000 to 140,000. It is accessible to vessels of 25 feet draft, and has 60 berths at which vessels drawing 19 to 25 feet may lie, and a total discharging capacity of 300,000 to 500,000 tons per month. In 1917, although only military stores were permitted to enter and the new docks were unfinished, there was being discharged and transshipped to the interior of Russia about 120,000 tons per month. Even under present conditions, there have been imported about 110,000 tons and exported about 30,000 tons since occupation by the Allies on August 3, 1918.

Archangel-Vologda Railway.

The Archangel-Vologda Railway has a capacity of 200,000 tons per month all the year round, the North Dvina River waterways 50,000 tons per month during six months, and a coasting trade of 15,000 tons per month.

Accessibility of Port.

The port is inaccessible to ordinary traffic only from January 1 to June 1 of each year, a period of which may be reduced one to two months by the use of ice breakers. On January 10, 1916, the Russian volunteer steamer *Dvinsk* made her own way in to near Economia, discharged on the ice and went out. In February, 1918, two merchant steamers made their way out to sea from Economia, although the ice was particularly heavy at this time. Although the harbor of Arch-

angel is usually frozen over in December, the White Sea remains open until January, and well-built steamers can make their way into the port. During the months of March, April, and May, navigation in the entrance to the White Sea is extremely difficult, and even dangerous, so that during this period the port may be considered as unqualifiedly closed to ocean traffic, even against ice breakers. The erroneous impression that Archangel is closed by ice from October 20 is due first to the confusion caused by the use of the old Russian calendar, and second to the fact that Russian sailing directions for this vicinity refer principally to navigation of sailing vessels and of older type of steamers. A modern well-built merchant steamer, drawing not over 24 feet, should find no difficulty in entering or leaving Archangel at any time before January 1. Another erroneous impression is that Archangel is just around the corner, so to speak, or only an hour or so from Murmansk. In reality the distance is 430 miles, and the passage requires careful navigation.

Location.

Archangel is 720 miles from Moscow and 760 miles from Petrograd. Petrograd itself is 416 miles from Moscow. City of Archangel is located on slightly elevated ground, on right bank of Dvina near its mouth, and where the river breaks into several channels, forming with the low islands between them the Dvina Delta, covering about 400 square miles. Opposite Archangel and on the left bank of Dvina is Archangel railway station, and the wharves and storehouses of Bakaritza.

Channels.

Each of the channels through the Delta is obstructed by bars, separating them from the White Sea, which in this vicinity is called Dvina Gulf. The channels used are three in number.

(*a*) *Nikolski Channel.*—This branches off opposite Archangel and runs westerly, about 28 miles, with a bar over which only about 8 feet can be carried. This channel has no navigation marks or lights, and is used only by small coasting vessels.

(*b*) *Murmanski Channel.*—This leaves the river opposite the island of Mossaev, running in a general northwesterly direction, and has over the bar a depth of about 11 feet. Attempts have been made to improve this channel by dredging, but project was abandoned.

(*c*) *Korabelnyi Channel.*—This runs about north from the city and is the main and most important ship channel. It has two parts, of which the Maimaksa is the deeper, and although it has numerous sharp turns, is nevertheless used almost entirely by shipping. This channel issues into Dvina Gulf through the Beresovi Bar, 35 miles from Archangel and abreast the middle of Modyugski Island. This bar constitutes the principal obstacle to entrance of deep-draft vessels.

The channel through Beresovi Bar is a little over 1 mile in length, 350 feet in width, and has been dredged out to have at high water 26 feet. In smooth weather and the normal rise of 2 to 3 feet there is no difficulty in taking 25 feet through this channel. With southerly winds the depth may be reduced 1 foot, and on the other hand with northerly winds the depth may be slightly increased. While passing over it October 29, 1918, with U. S. S. *Olympia*, drawing 24 feet 6 inches, the least depth with hand lead was 27 feet, fairly hard bottom. During winter, when Dvina River is frozen over, there is usually a foot or more less water on the bar. During spring floods 28 feet may be taken over. Good ranges for both day and night are constructed on southern end of Modyugski Island, and Korabelnyi Channel is well marked and lighted.

Channel Marks.

The channel through the bar was formerly marked by buoys, but these were taken up before the Allied occupation on August 3, and have not been replaced. Instead, stakes with cage marks now mark the channel, but will soon disappear when ice forms.

Light Vessel.

The North Dvina Light Vessel is moored off White Sea entrance to the bar, in 7 fathoms, latitude 64° 57′ 10″ north, longitude 40° 07′ 30″ east from about June 15 to November 15. The vessel is painted red, with vertical white stripe amidships, and has two masts, the mainmast carrying a bell at the masthead. The light vessel was withdrawn on November 12, 1918.

Fog Signal.

During thick or foggy weather, a siren on light vessel is sounded for 20 seconds with intervals of 80 seconds. If siren is out of order the bell and horn are sounded alternately (thus): Bell 3 minutes, intervals 5 minutes, horn 3 minutes, interval 5 minutes, and so on.

Pilots.

During open season, pilots are stationed on the light vessel to conduct vessels into Archangel at any hour of either day or night. When light vessel is withdrawn, pilots are then stationed at Modyugski Lighthouse until navigation is completely closed. The pilots are careful, capable, and very reliable, but do not handle ship very well.

General Ice Conditions in Northern Russia.

About beginning of October all rivers in northern Russia begin to freeze over at their headwaters. The freezing extends gradually down the rivers, and the closing of navigation can be foretold to some extent by the progress which fixed ice has made down the river. In the spring the rivers begin to clear their headwaters in

April, and the clearing also progresses gradually downward, and permits a forecast as to probable time of clearing of the entrance. Large bodies of water like the White Sea behave quite differently, freezing over much later than the mouths of the rivers, opening much later, and having entirely different ice conditions.

Ice Conditions at Archangel.

The average time of beginning of fixed ice in the port of Archangel is November 15, the earliest date being November 3, and latest date December 5. In 1917 the port froze over on November 18 and the ice quickly attained its maximum thickness of 24 to 28 inches. After freezing over, the ice for a week or so is not so thick as to prevent a well-built merchant steamer from making her own way in. Maimaksa Channel being very narrow usually freezes over before the port, but Economia and Beresovi Bar may be quite free from ice for a week or so later. In 1918 floating ice began to appear off the city front of Archangel on November 22, the thermometer ranging during this week from 18° to 27° F. On November 25 the thermometer was —1° F., and the river opposite Archangel was covered with fixed ice 2 to 4 inches in thickness. Maimaksa Channel was frozen over with a thickness of 6 to 7 inches, sufficient to bear horses and sleighs. Ice became gradually thinner after passing Economia, and at Beresovi Bar there was practically no ice. After passing Beresovi Bar the temperature rose about 10°, with moderate westerly winds, and the next day off Sviate Noss the temperature was 28° F., no ice whatever being encountered in White Sea or the entrance. On approaching Kola Gulf temperature fell gradually and at anchorage off Murmansk was 21° F.

Ice in White Sea.

Ice in the White Sea and on Beresovi Bar depends to a great extent on the winds, which even in very cold weather may prevent its formation or break it up if less than 2 feet in thickness. In entrance to White Sea the ice forms a continuous field with the polar pack, and under influence of winds and currents overruns and banks to a thickness of 8 to 12 feet. In 1918, ice in the Gorla did not clear until beginning of July, which is the latest date on record. When the ice begins to clear in the Gorla usually in May or June, navigation is extremely dangerous. Under influence of offshore winds there will sometimes be a clear passage between the ice and the shore, and if the wind should change the ice closes in again on the shore and pinches a vessel which may be trying to make an early entry. Vessels attempting to enter about this time find occasionally open leads through the ice during high tides, but these will close during the low tides.

The North Dvina and port of Archangel usually open up and are clear of ice by the 1st of May, but access to the port is prevented by heavy ice in the White Sea or Gorla.

Port of Economia.

Due to the fact that port of Archangel closes earlier than entrance to the Delta, the British in 1917 established a winter port at Economia, on the northern end of Povrakulski Island, at junction of Maimaksa and Kuzretchikha Channels, and about 20 miles from city of Archangel. This port is usually accessible for a month after Archangel is closed up.

Discharging Facilities.

At Economia are one coal berth and five cargo berths, capable of discharging vessels of 26 to 28 feet draft. One of the berths at present is not available, the ice breaker *Seweir Selushka* being sunk there. There are six storehouses and two movable cranes of 10 to 15 tons, with one fixed crane of 6 tons. For approaching winter it is intended to bring down to Economia one of the 50-ton floating cranes from Archangel.

Railway Economia to Archangel.

In 1916, a section of railway was completed from Port Economia to Archangel, crossing Povrakulski River and Kuzretchikha Channel on permanent bridges. During winter temporary tracks are laid across the ice of the North Dvina between Archangel and Archangel Station, so connecting Economia with railway system of Russia. Throughout winter of 1917–18, channels were kept open from White Sea to Economia, but ice of the entrance to White Sea or Gorla was impossible after March 1, 1918.

Ice Breakers.

In order to maintain communications with Archangel a number of ice breakers and several small cargo vessels capable of breaking light ice and classed as semi-ice breakers are attached to the port.

ICE-BREAKER FLEET.

Name.	Flag.	Date	Length	Beam.	Draft.	Horse-power.	Speed.	Condition.	Location.
Sviatogor	British	1917	323	72	25	10,000	16	Ex	Murmansk.
Kozma Minin	Russian	1916	248	57	22	5,500	14.5	V. G	Archangel.
Kniaz Pozharski	do	1916	248	57	22	5,500	14.5	V. G	England.
Kanada	(?)	1909	250	67	23	7,000	16	Un	Repair.
Ilya Murometz	French	1915	211	50.5	20	4,300	14.5	Un	Do.
Alexander	British	(1)	(1)	(1)	(1)	(1)	(1)	Ex	Archangel.
Ivan Susanin	Russian	1899	225	32.5	20	3,200	15	V. G	Kem.
V. Silanovitch	do	(1)	(1)	(1)	(1)	(1)	(1)	Un. repair.	Do.
Vaigatch [2]	do							V. G	Do.
Gor	do	1909	120	27	17	1,330	12	(?)	Archangel.
Melner	do	1878	93	27	14	450	9	Poor	Do.
Ice-breaking tugs (5)	do	1916	130	31	14.5	1,200	12	V. G	Do.

[1] No data.

[2] Russian ice-breaking gunboat.

The *Sviatogor*, 10,600 tons, is a large, new powerful ice breaker of *Ermak* type and almost exactly same dimensions, with excellent engines and triple screws. She is capable of steaming at 6 knots through 4 feet of ice, if not covered by snow, or of making her way through 8 to 12 feet. During the winter 1918–19, she will be stationed at Murmansk, and operate from there to break a way for vessels through the Gorla.

Kozma Minin, *Kniaz Kozharski*, and *Ilya Murometz* can break through 4 to 5 feet of ice, and will be used to break the way from the Gorla to Archangel.

Vaigatch and *Ivan Susanin* can break 3 feet and will probably be used on the Archangel-Kem route.

The smaller ice breakers and ice breaking tugs are for harbor work, and for channels leading into Archangel.

The ice breakers have no facilities for carrying cargo, but can carry troops.

Semiice Breakers for Cargoes.

In addition are five vessels, especially strongly built, and with limited cargo capacity, which are intended to maintain communication with Murmansk, cooperating with the ice breakers, and carrying cargo and mail. They are capable of going through ice up to 2 feet alone, or through heavier ice when preceded by regular ice breakers.

Name.	Date.	Length.	Beam.	Draft.	Horsepower.	Speed.	Cargo capacity.	Location November, 1918.
S. Budimirovitch, formerly Bruce.	1911	250	36	17′ 9″	2,850	14	670	En route to England.
Semier Deshnew, formerly Adventure.	1906	265	38	18′ 6″	2,000	12	1,200	England; repairs.
Alex. Sibiriakoff, formerly Bell Adventure.	1909	241	35	18′ 1″	2,000	13	800	Archangel.
Vladimir Roressanof, formerly Bonadventure.	1909	240	35	17′ 7″	2,200	13	750	En route to England.
George Sieydoff, formerly Bepthee.	1909	241	35	18′ 6″	2,000	13	2,000	Do.

After January 1 these vessels are to be put on the Archangel-Murmansk route.

All river craft and small vessels in Archangel are now laid up for the winter.

Berths for Discharge in Archangel.

The following table represents berths available for discharge:

	Coal.	Cargo.	Depth alongside.	Number of storehouses.	Manner of discharge.
Archangel City	None.	*3	19	(1)	Generally trucks.
Archangel Station	4	4	13–21	8	Ship's tackle.
Smolny (Archangel)	None.	6	25	12	Do.
Moses Island	2	None.	19	None.	Trucks and ship's tackle.
Solombala	6	None.	19	None.	Cranes and ship's tackle.
Economia	1	4	26–28	6	Do.
Roushevki	*4	None.	22	None.	Trucks and ship's tackle.
Bakaritza	12	14	19–25	36	Trucks and cranes.
Total	29	31	.....	62	

[1] Commercial.

Docks marked with an asterisk (*) are temporary or open pile piers with planking laid on top, and only for use during open season. When ice begins to form, planking is removed, piled on beach, or replaced on approach of spring. It is planned to increase the number of coal berths at Archangel Station.

Manner of Discharge.

Discharge is usually effected by ship's tackle, except at Bakaritza, where there are a number of Gaiety traveling cranes. Cargo bound up the Dvina is discharged into wooden lighters, of which there are a large number; but many, through lack of care or intentionally, have been sunk or so damaged as to be useless. Explosives are discharged from vessels in the stream into lighters, since several vessels were blown up. There is need of large seagoing lighters for intercommunication between White Sea ports.

Supplies Now at Archangel.

There is at present in Archangel sufficient provisions to supply the Expeditionary Forces and population of city and Province for nine months. There is a shortage of about 20,000 tons of coal of the amount estimated to be necessary for the winter.

In 1917 supplies were brought into Archangel at the rate of 120,000 tons per month, mostly war supplies. These were to a large extent transported into interior of Russia during the winter of 1917–18, but in May, 1918, there were still at large supplies of metals, coal, and provisions, which had not yet been evacuated. Most of them, except the coal, were shipped out by the Bolsheviks before the occupation of Archangel by the Allies on August 3. There was still left, however, about 25,000 tons of valuable stores of various kinds, the exact ownership of which is not decided.

Imports and Exports in 1918.

Since July 1, 1918, imports and exports of Archangel have been as follows, up to September 30, 1918:

IMPORTS.

From—	Military supplies.	Local supplies.	Coal.	Fish.	Total.
United Kingdom	36,638	.....	2,750	549	39,937
United States	22	15,052	.....	.....	15,074
Norway	.....	.....	.....	4,185	4,185
Total	36,660	15,052	2,750	4,734	59,196

EXPORTS.

To—	Flax.	Timber.	General.	Total.
United Kingdom	9,798	3,121	1,913	14,832
United States	3,588	.....	472	3,530
France	418	921	1,432	2,771
Total	13,804	4,042	3,817	21,133

Since September 30 about 50,000 tons of coal, 37,000 military supplies, 6,300 tons admiralty supplies, and 5,000 tons local supplies have been brought in.

There is at present in Archangel considerable amount of flax for shipment, and an immense amount of sawn lumber piles, telegraph poles, crossties, and pit props, which have been stored ready for shipment for several years. It is said that the British have already closed contract for most of this flax and lumber.

Repair Facilities.

At Solombala are the principal repair yards, partly under control of the naval department, but mostly at this time under commercial control. The naval yard has facilities only for minor repairs to small craft as tugs, trawlers, etc. The commercial yard has control of the docks, and can make major repairs to hull and machinery of large vessels. It is now, however, very short of material and tools, and almost entirely lacking in pig iron. Unless new supplies are received it will probably have to stop work in a few weeks. Labor conditions are also very unsatisfactory. There is plenty of labor available, but there is no currency in which to pay it. During course of inspection of this yard there was a demonstration by the unpaid workmen. At present about 1,300 men are employed, but the number decreases daily, although with material and prompt payment 2,000 men could be kept employed, and there is sufficient repair work on vessels in Archangel to keep twice this number busy. Theoretical working hours are eight hours per day, with pay of 18 to 40 rubles (equaling at present local rate of exchange $1.80 to $4), with sub-

sistence. Actually the workmen do not perform more than four to six hours' labor per day.

Dry Docks.

There are three floating docks and one dry dock at the Solombala yards. On account of damages to the caisson of dry dock, it can not be pumped dry.

DIMENSIONS OF DOCKS.

	Length.	Entrance.	Depth over sill.	Capacity.
			Feet.	*Tons.*
Dry dock	320	35	14	
Floating Dock No. 1	104	54	16½	1,900
Floating Dock No. 2	158	54	16½	1,300
Floating Dock No. 3	365	60	21	4,500

The basin of the dry dock is especially wide and can accommodate three vessels, capable of entering, lying side by side.

Floating Docks Nos. 1 and 2 can be joined together and operated as one dock lifting 2,200 tons.

About 8 miles from Archangel, on the Laya River, is a commercial dry dock operated by the Murman Steamship Co.. which admits vessels of 238 feet in length, 52 feet beam, and 14 feet draft. There are no repair shops connected with this dock.

Definitions.

(*a*) Kola Peninsula. That part of Archangel Province forming a peninsula between the Arctic or Northern Frozen Ocean and the White Sea.

(*b*) Murman coast. North coast of Kola Peninsula from Pechenga to Cape Sviate Nos.

(c) Terski coast. East and south coasts of Kola Peninsula.

(*d*) Gorla is the strait forming entrance to White Sea and connecting the Arctic Seas with the White Seas. It usually refers to narrowest portion of this strait.

(e) White Sea is the inclosed sea to southward of Kola Peninsula.

(*f*) Lapland is an indefinite term, comprising vicinity inhabited by Lapps, and includes portion of western part of Kola Peninsula, of northern Finland, and northeastern Norway.

THE OIL AND FUEL SUPPLY OF JAPAN AND HER NAVY.

Source: Reliable.

17 June 1919.

(3958.)

The fuel question is accompanying the most important position in our various industrial enterprises as well as in our daily life. Above all, from the standpoint of our national defense, our Navy fuel ques-

tion should be considered with great importance. We see a tendency for its neglect in Japan.

The Japanese Navy is using a mixture of coal and oil. The mixture is composed of one part of fuel-oil to three parts of coal. These proportions have given the best results. For instance, if an engine develops 45 brake horsepower when its steam is produced by firing with coal, the same engine will develop 90 brake horsepower when its steam is produced by firing with fuel oil. Yet owing to the scarcity of our oil supply and its high price, by using the above-mentioned ratio of one part in three, we can secure the greatest efficiency in fuel for our Navy, from an economical standpoint. However, our submarines and torpedo-boat destroyers are using ordinary unmixed crude petroleum for fuel. The Japanese Navy is burning mixed fuel in big ships only.

The navies of both France and Italy are using all three kinds of fuel at the same time under separate boilers of a man-of-war. That is, on board a warship they are burning a mixture of coal and oil under certain boilers and under other boilers they are firing with coal, and under still other boilers they are burning crude petroleum.

In general there is a tendency for the navies of all the powers to burn crude petroleum without mixing it with any other fuel. As for Japan, we must abolish the burning of mixed fuel in big ships in the future and it is necessary that we must at least burn unmixed fuel in all warships which we will build after the *Nagato*.

The question is whether Japan can meet the demand of her navy for crude petroleum or not. To-day we produce natural oil to the amount of about 350,000 tons. When we refine it into crude petroleum, it will become about 100,000 tons. It can hardly reach by one-third Japan's ordinary demand. In fact, according to our recent industrial development, we use this 100,000 tons of crude petroleum first for our commercial purposes, and our navy has no chance to use even a drop of it. Therefore, we are at present buying for our navy fuel about 200,000 tons of crude petroleum from both East and West Borneo. Up to the present time the production of crude oil in Borneo is still insufficient. It is necessary for us to choose another source of supply for crude oil.

California is now a suitable place to meet our demand for fuel oil, but on account of the great distance intervening between the California oil fields and Japan, it will be absolutely impossible to receive an adequate supply from America if we use only our two oil-carrying vessels which are running between Borneo and Japan. Therefore, the navy has decided to build another oil ship of between 8,000 and 10,000 tons. (About 200 yen per ton will be sufficient for her construction.)

Until about May of next year we may make arrangements to import American crude petroleum.

The navies of the European powers are importing their supplies of crude petroleum as follows: France and Italy are importing from Mexico; England is importing from Persia, Mesopotamia, Borneo, Central America, and South America.

England is meeting the great demand for fuel of her navy by developing the oil fields of Persia. A British corporation called the Persian Oil Co. has invested about 15,000,000 yen of a fund of 25,000,000 yen. The oil fields of Mesopotamia are being put under British control.

The American Government has now taken over the control of a great oil field and she is keeping the door of this fuel supply absolutely closed against its development by other nations. She permits the export of crude oil from other oil fields.

Looking at the fuel-oil supply of Japan from a financial standpoint, as well as from her natural resources of crude oil, we find it will be very difficult for her to be independent of foreign oil supplies.

Japan can not depend upon receiving crude oil from foreign nations during war. Therefore our naval authorities asked Parliament during its fortieth session (forty-first session ended in March, 1919) for an appropriation to pay the expenses of prospecting for oil in Formosa. At present we are driving trial wells for oil at Mairyo and at Tosen under the direction of Hoden Nisseki. According to reports received at the navy department, these wells have been driven only 80 ken (1 ken equals 5.965 feet) of a total depth of 500 ken, as planned. Owing to the slanting stratum the drilling is difficult. Some time may be taken before we see the gushing natural oil of these wells.

However, it is not necessary for us to feel pessimistic about the future of the Formosa oil fields, judging from results obtained from her oil wells of the past. In Kuba 10 foreign companies drove 20 oil wells. The drilling was stopped once without finding oil, but later oil was struck unexpectedly and its production reached about 6,000 koku (285,959 gallons).

The question of sinking experimental wells for oil was debated before the naval budget committee meeting recently. It was decided that only two experimental wells will not be enough for a thorough search for oil and that it will be necessary to bore other wells.

As the present supply of Formosa crude oil is not sufficient our navy is importing oil from Borneo. We have heard that new fuel supplying plants for the navy are being established at Kiroshima Prefecture as a branch of the Kure Naval Station and also at Yokosuka and Sasebo Naval Stations. (The details are being kept secret.)

Regarding the Japanese coal fuel question, at present we are manufacturing for our navy half-smokeless coal by mixing "smoky coal" and "smokeless coal" at the Tokuyama Coal Refinery.

American Pocahontas and Welsh Cardiff are natural half-smokeless coals. Japan has no natural coal comparable with these.

In Sanseisho, China, half-smokeless coal is formed which is only a little inferior in quality to that of England and America.

Under the Shantung decision, Japan has secured mining rights over the Shisen coal mine. This mine can produce from 40,000 to 60,000 tons of Chinese half-smokeless coal for our navy.

Our domestic production of coal is not more than 70,000 tons. This will be insufficient to meet the future demands of our navy.

Coal and oil are not only important for our warship fuel supply, but also they are necessary for our army and navy aeroplanes, military and private automobiles and trucks.

Therefore our expert military opinion on the subject is, we must prepare for future times of need by protecting our domestic fuel production and developing our foreign supply during times of peace.

NAVAL HIGHER COLLEGE, TOKYO, JAPAN.

Source: Reliable.

9 June 1919.

(11856.)

There are two classes of 30 each taking the regular two-year course. These classes are the seventeenth and eighteenth, the college having been that long in existence. They graduate and commence in December.

There are also some 20 officers taking the engineering course and 15 taking the navigation course.

The college is primarily for lieutenants who have completed the gunnery and torpedo course at Yokosuka and done two or three years at sea afterwards.

There are a few lieutenant commanders. At various times there have been three-week courses for flag officers. Before 1914 there was a six months' course for captains.

The regular course comprises: Strategy and tactics; logistics, international law, administration, organization, material for preparedness and for carrying on war, military geography, sanitation, history, and languages (English, French, and German).

After completing the course at this college every officer then chooses what branch of the naval profession upon which he will thereafter specialize.

English is compulsory in all the middle schools of Japan (13 to 18).

Every graduate of the Naval Higher College wears a metal badge, and this is a mark of distinction and highly coveted.

There is a main office building containing administrative, study, and lecture rooms; also a building that provides a maneuver board room and also a set of rooms for carrying on a strategical game.

The maneuver board is of about the same size as the one at Newport. There is a platform on one side of the room and a long desk arrangement on the other side of the room for the accommodation of the umpire and the force commanders and their staffs. A curtain pulls up and down, and small signals are shown and hauled down as in practice.

The umpire has a clock arrangement in front of him that announces the number of the move by ringing a bell and displaying the figures.

Each little lead ship is mounted rigidly in the center of a light metal circular flat disk, whose edge is graduated.

The diameter of the disk is equal to the distance in formation between the ships of that class.

A vertical wire from the center of the disk rises through the ship and on it can be placed various indicator signs of painted tin to show that the vessel is a flagship, or a submarine awash, or submerged.

The maneuver board itself is painted with white enamel, and lead pencils are used instead of chalk. The center of the board is fixed (stationary). The outer portions are 10 spaces square and mounted on four legs and rollers, being used when necessary and pushed aside when not needed; thus affording easy convenient approach to the center of the board.

The rooms for the various units of the opposing forces in the chart maneuver (strategical game) are grouped on opposite sides of the central big staff (umpire) room, which has a telephone connection to each room.

Aeroplanes are represented by small models that move up and down on a graduated vertical wire, rising from the center of a metal disk provided with four lightening holes and graduated on the edge.

The range wands are of triangular section, painted with white enamel and figured in black.

In calculating the number of hits made by a salvo, the most recent large practice results are used, being arranged in tabular form as at the United States Naval War College.

CURRICULUM OF SEVENTEENTH CLASS.

Regular Course.

Course, 2 years; 25 members.

Subjects:		Hours.
Strategy, first and second years		50
Chart maneuvers, first and second years		400
Tactics, first year		100
Naval war game, first and second years		280
Tactics, torpedo warfare, first year		40
Design for defense, first year		20
Tactics, land warfare, first year		40
Battle duties, first year		60
Preparations for expedition, second year		
Naval history, Japan-China War		
Naval history, Japanese-Russian War		
Naval history, American-Spanish War	first and second years	160
War history, Anglo-French Wars		
War history of Europe		
General history, first year		48
Naval administration, second year		30
Supplies and accounts, second year		30
Engineering, first year		26
Shipbuilding, second year		20
Explosives, first year		8
Ordnance, shell and armor plate, second year		10
Torpedoes, first year		20
Mechanical mines, first year		20
Submarines, first year		18
Aviating machines, first year		10
Wireless telegraphy, first year		20
Navigation, squadron, second year		20
Military geography, first year		20
Fortification and land surveying, first year		30
Transportation Communication	second year	20
Sanitation, first year		14
Constitutional law, first and second years		40
International law, second year		58
Criminal law, first year		14
Navies of powers, first year		20
Statistics		
Foreign languages, one of the following:		
English French German	first and second years	200
Lectures, first and second years		120
Practical works, military science, first and second years		250
Maneuvers		
Visits		
Practical works		

Engineering Course.

(Course, 2 years. Ninth class, 10 members; tenth class, 15 members.)

Subjects:	Hours.
Thermodynamics, first year	35
Steam engines, first and second years	100
Internal combustion engines, first and second years	60
Construction and theory of moving parts, second year	30
Theory of resistance and propulsion of hull, first year	40
Design, first and second years	484
Electrical machines, theory and application, first and second years	200
Electrochemistry, second year	40
Electrooptics, second year	34
Communication by electricity, second year	32
Special kinds electrical apparatuses for warlike purposes, second year	20
Installation of electrical weapons, propulsion by electricity, second year	36
Measurement of electromagnetism, second year	40
Design, first and second years	134
Method of control, second year	60
Shipbuilding, second year	60
Essentials of fighting force and meteorology, first year	30
Naval administration organizations and finance, second year	40
Warlike instruments, second year	20
Munitions, first year	60
Manufacturing metallurgy, first year	60
Dynamics, first year	80
Hydrodynamics, second year	30
Strength of materials and construction, first year	80
Integral and differential calculus, first year	90
Differential calculus, equation, first year	30
Analytical geometry, first year	30
Dynamics, first year	120
Physics, first year	120
Language, first and second years	120
Lectures, first and second years	150

Navigation Course.

(Course, 9 months. Eighteenth class; 20 members.)

Subjects:	Hours.
Piloting	44
Single ship and squadron maneuvers	30
Compass	20
Magnetism	34
Compensation of compass	42
Other piloting apparatuses	20
Coast surveying	30
Meteorology	50
Oceans and seas	30
Astronomy	65

Subjects—Continued.	Hours.
Tactics War game	100
Battle duties	20
Military geography	20
Shipbuilding	40
Engineering	20
Mathematics	83
Physics	100
Dynamics	78
Seamanship, practical works (days)	75
Navigation works	45
Lectures	
Visits	

ELECTIVE COURSES.

(One year.)

Subjects:	
Design of naval engine—	
Construction and theory of engines	80
Design of engines	716
Practical engineering	
Shipbuilding	154
Method of control	80
Applied mathematics	90
Lectures	80
Design of electrical apparatuses for naval purposes—	
Theory of electromagnetism	80
Measurement of electromagnetism	80
Electrooptics	40
Wireless telegraphy and telephony	34
High-frequency electrical machines	20
Electrical materials	30
Special kinds electrical weapons	25
Transmission and distribution of electricity	46
Direct and alternate current electrical machines	430
Equipping of men-of-war and other vessels	50
Secondary batteries	55
Electrical illumination	65
Measurement of electromagnetism	
Method of mounting	
Testing of new and repaired machines	
Method of control	80
Applied mathematics	90
Lectures	75

REPORT OF ALLIED INSPECTION COMMISSION—GERMAN PORTS.

Source: Reliable.

19 June 1919.

(11287F.)

Food Situation.

There appears to be no change at the ports visited in the general food situation, food supplies imported by the Allies have had as yet little effect, but as these ports are situated in an agricultural country, they would be some of the last to obtain them. At Wilhelmshaven and Cuxhaven it was stated some bacon and flour (one-half pound per head per week) can now be obtained, but at high prices (12 marks and 5 marks 40 pfennigs per pound). At Danzig there were complaints that the Allies were feeding the Poles and not troubling about the Germans.

The crops appear to be distinctly good.

The following details obtained at Danzig are an example of the general state of affairs, though the amounts vary in different places:

Milk: Only obtainable for the sick, and then by coupon.
Butter: 62 grams per fortnight.
Margarine and lard unobtainable.
Fresh meat: 200 grams per head per week.
Bread: Much adulterated and strictly rationed.
Tea, coffee, cocoa, and sugar practically unobtainable.
Dried fruits, prunes, etc.: 15 marks a pound.

In Neufahrwasser a woman stated that her brother, a prisoner of war in England for some time, had returned home via Switzerland in very good health and was horrified to see his family looking so thin and underfed.

The attitude of the people is still listless and apathetic with a general hopelessness of outlook. The fine weather has had some effect, and in the various ports and rivers visited the populace are enjoying themselves boating and yachting, quite a number of well found yachts being seen.

Labor.

The eight-hour day (7 a. m. to 3 p. m.) is in force everywhere at the standard rate of 2 marks 40 pfennigs per hour, which it was stated in one quarter is shortly to be raised to 3 marks per hour.

Several naval officers and shipyard officials in answer to inquiries for estimated time for completion, etc., stated "in old days three months, but nowadays six months—the men don't work." On the other hand, the representative of the Hamburg American Line at Cuxhaven stated that men were settling down, producing better work, and not averse to overtime. From observation at the various yards

visited very little work appeared to be going on, but possibly this was the after effect of the Whitsuntide holidays.

The impression is that labor troubles (? born of hopes) are as bad in England and France as in Germany, also that Bolshevism will eventually spread to Entente countries, the recent troubles in Canada being instanced as evidence of this.

Prices.

Prices are extremely high. The following details are of interest:

Washing: One starched collar, 1 mark 80 pfennigs. One soft shirt with starched cuffs, 2 marks 60 pfennigs.

Clothes: Naval monkey jacket, prewar 80 marks, now 500 to 600 marks.

Naval officers' pay has been raised about one-third and allowances for children are now paid. No increase in the pension has, however, been made.

At Danzig (headquarters of the various commissions for the relief of Poland) the arrangements in the hotel for dinner are as follows: The Germans obtain the ordinary bill of fare, which is poor; the commissions sit at two big tables and have an excellent and well-cooked meal. The price is the same for both, however, 19 marks.

For a drive of 5 miles and 5 miles back empty, a taxi driver demanded 150 marks and was paid 120.

Fuel.

Shortage still continues. It is generally anticipated that there will hardly be enough to warm the houses in the coming winter, and what with that and the food question, trouble may be anticipated which may end in another revolution and the establishment of a dictatorship, and that a royal one (a Prussian dream?).

Spartacus movement, though not at present active, is still there and may break out at any moment.

Peace Terms.

The opinion of naval officers, particularly Prussian, appears to be that no country could possibly accept them. Rather they would say, "Come, take the country, use it as a colony, but no one could sign the terms in their present form."

The present Government is considered very weak, Noske being the only strong man in it. Ebert is reported to be drinking heavily.

Particular objection was taken to the partition clauses and loss of colonies. Money payments were stated to be impossible.

The mention of a plebiscite in Schleswig provoked the retort that it would not be a fair expression of opinion, due to Danish propaganda. The justice of reparation and compensation did not appear to be realized.

THE SUPPLY OF MEDICAL REMEDIES IN GERMANY AT THE END OF THE WAR.

Source: Reliable.

24 June 1919.

(4904.)

The German Pharmaceutical Society has published a series of reports regarding the traffic in medical remedies during the four years of war (Prof. Thoms, Dr. R. Luders, Dr. S. Herzog), from which it can be inferred that even at a comparatively early stage of the war it was clearly perceived in Germany that great difficulties with regard to the medicine supply would arise through the duration of the war.

As early as the year 1914, it is admitted in the report for that year that important remedies, such as castor oil, were scarce, and that the procuring of antiseptics had placed new problems before the pharmaceutical industry. The change in the quality of the preparations was perceptible in the year 1916, and a number of substitute preparations had to be introduced.

The German authorities soon found themselves obliged to take measures against the increasing difficulties, so decrees were issued fixing maximum prices, standard prices, and ordering confiscations and declarations of stocks, etc. A view of the unfavorable situation as regards the supply of medicaments in Germany in the year 1918 is afforded by a table drawn up by I. Herzog, giving the chemicals, preparations, and drugs *no longer obtainable*, as well as those *difficult to procure.*

The list is incomplete, and to it are still to be added the remedies that were under the management of the war societies. Furthermore, the supplies of numerous other medical remedies such as coca leaves, China bark, opium, morphia, codine, aethylmorphine, diacetylmorphine, apomorphine, pantopon, styptol, etc., also ran short. For the purpose of rationing the supplies of iodine preparations it was laid down by the iodine convention that the consumers, apothecaries, hospitals, etc., would only be permitted to supply their most urgent needs for a period of two months.

We here reproduce the list:

A. ARTICLES NO LONGER DELIVERABLE.

1. CHEMICALS AND COMPOUNDS.

Acicum chomicum and salts, Acidum comphoricum, Acidum phosphoricum, Albumen ovi siccum, Aqua amygdalarum amar, Arccolin hydraetloricum and Arccolin hydrobromicum, Argentum colloidale, Balsamrun canadens, Copaivas, Peru vianum, Tolutan, Bismutum subnitricum and almost all Bismut salts, Camphora monobromatae

and synthetic, Canthridin, Ataccum, Emetin, Emulsio oil, Gecoris aselli, Kalium sulforalum, Kefir, Hydrargyrum oleinicum, Gryacol carbonicum, Leutkin, Mel depuratum, Melkylsulfonol, Natrium oleinicum, Oleum cacao, Paraffinum liquid and solidum, Ohysostigmin salts, Podophyllin, Resorun, Strychnin, Styrat, Sulphur praccipotat, Tartarus borasat, depuralum, natronatus and nibratus, Thymol, Tranmaticin, Vaselin (white and yellow).

sumer.

2. DRUGS.

Amygdal, Agar-agar, Bulbus scillae, Cortex cunnamami, Cascarillae, Quillayae, Crocus, Flores aurantu, Cassiae, Fruetus amorni, Capsie, Sardamomi, Carvi cynosbati, Vanillae, Lauri, Myrtilli, Herba centauri, Lobacliac, Majoran, Lycopodiuin, Macis, Mastia and Sandarae, Pyser album, ingrum, Rad. Ipccacuan Thae and Senegae, Rhyomo lingibeus, Semen Erncae and Foenugracci.

B. REMEDIES DIFFICULT TO PROCURE.

1. CHEMICALS AND COMPOUNDS.

Acidum carbolicum, Argentum proteinicum, Bromoform, Glycerino phosphate, Hypophosphite, Calcium laciticum, Coffein salts, Gatracta fluida, Ferum lactica, Atheric oils, Pepsin, Phenacetin, Saccharum lactis, Santonin, Succus liquititac, Tcopinhydrat, Zinc salts.

2. DRUGS.

Aloe, Carrageen, Caryophylli, Cortea aurantu, Flores chamomull, Sambucu, Folia zuglandio, Menthae, Stramonii-Fructus anisi, Herba thymi, Veronicae, Violac tricoloris, Lignum guajaci, Quassiae, Sassafras, Piadix, Althaeae, Gentianac, Liguirittae, Ononidis sarspatille, Phizoma graminis, Tormentillae, Secale cornutum, Semen arecae lini, Pavaveris, Quereus, Sabadillae, Sonapis.

The lack of sick-nursing requisites and particularly the most essential kinds of nourishment, caused still greater difficulties than the lack of the more important medical remedies. It may be said that the care of the sick in Germany was shifted back several decades by the want of the requisite remedies, even though, on the other hand, substitutes of serviceable quality were provided, such as, for instance, "pergut" and "celloplast," which form a paper substitute for gutta-percha.

The answer to the obvious question as to how Germany managed to provide substitutes for all these important stuffs is that Germany only succeeded to a limited degree in relieving the distress by calling *technical chemistry* to her aid for the creation of important products, which not only helped her to carry on the war and benefited German agriculture, but also rendered great services to pharmacy. The im-

portance of *synthetical chemistry* in Germany is likewise great, and the synthetic products, such as suprarenin for the natural adrenalin, hydrastinin for the lacking extractum hydrastis, and others, have contributed very much toward relieving the want of medicinal stuffs.

The results attained by German chemistry, in so far as they have a bearing on the present subject, will be briefly set forth in the following:

Sulphur.—Germany's prewar requirements in the way of sulphur were covered by abundant imports from North America and Sicily. The increased needs, both for war purposes (illuminating mines) and also in consequence of the greater spread of skin diseases among human beings and animals, for medical purposes, soon gave rise to a scarcity after the cutting off of the import supplies, so Germany set about producing sulphur from the raw materials on hand. The best basic stuff proved to be *plaster of Paris.* This is reduced to sulphate of calcium, which is treated with chloride or magnesia which can be extracted from the lixivial waste of potash manufacture, and the sulphydric acid obtained is burned up by the introduction of an insufficient fixed supply of air. The sulphur thus produced does not possess the beautiful, golden-yellow color tone of sulphur sublimatum, but a pale yellow tone like sulphur praecipitatum; is very pure, and, as numerous analyses have shown, is for the most part free from arsenic.

Sulphuric acid was likewise partly obtained from plaster of Paris by burning up the sulphur obtained from sulphide of calcium; but the greater amount of this acid was obtained from pyrites, smaller quantities being got from native sulphide of zinc and lead glance, from the gaseous mass and blasting-furnace slag. In this the productive power of the German chemical industry was very great.

Acetic acid and ethyl alcohol.—In consequence of the lack of spirits of wine and most of the wood-distillation products, the want of acetic acid was so great that such preparations as liquor potassium acetate, acetum sabadillac, and others, could no longer be made up in the chemists' shops. The utilization of carbide of calcium for the production of alchol and acetic acid considerably facilitated matters. From the acethyl, formed by means of water out of the carbide of calcium, aldehyde is made by passing the acethyl into a weak, not more than 6 per cent solution of sulphuric acid containing mercuric oxide, whereupon the aldehyde, by the aid of contact substances like uranic oxide, is oxidized into acetic acid. Reports state that there are in Germany factories producing 25,000 tons of acetic acid annually by the process described above. Besides acetic acid, also other important chemical products, such as aceton, which is the importance for the india rubber synthesis, are obtained by this process.

By the reduction of the aldehyde, alcohol can be obtained and it is possible that this process may in Germany become of great practical importance, particularly since the German food department has quite prohibited the use of potatoes for the manufacture of spirit, or at all events only allows it to a very limited degree.

Wine spirits are also obtained in Germany from the sulphite lixivial waste and in the wood-spirits distilleries, but so far only in inconsiderable quantities.

Ammonia and nitric acid.—How far Germany has succeeded in making herself independent of foreign countries as regards saltpeter, or nitrogen on the whole, has already been exhaustively dealt with in a special article. I desire, however, at this point to refer briefly to the question of *yeast*, which is closely bound up with the nitrogen question. According to a report by Dr. Hayduck, who conducted the work for the obtaining of the so-called *mineral yeast* in the Institute for Fermentation Purposes (Institut für Gärungszwecke), this ferment is made from molasses. It takes only about one-third of its nitrogen from the amino acids of the molasses and the other two-thirds from the added sulphuric ammon. The requirements in phosphorus and magnesia are supplied by superphosphate and magnesium sulphate. The mineral yeast obtained, which is manufactured in five factories in Germany, has been for the most part mixed with nonalbuminous feeding stuffs like dried heather, etc. Only a small part has been used as yeast for human food. Mineral yeast can not seriously compete with the cheaper albuminous feeding stuffs which must be imported into Germany, but it will undoubtedly attain considerable use as food yeast and for medicinal purposes.

Prof. Lindner has succeeded in breeding a fat mycelium (*Eudomyces vemalis*), which, just like the mineral yeast, uses sulphate of ammon as a nitrogen source.

Finally, a few words with regard to *glycerin*, which in prewar days was obtained in sufficient quantities in Germany by the decomposition of fat. Owing to the scarcity of fat in Germany during the war, however, another method of production had to be selected. It was technically impossible to make use of the synthetic process, so, as in the case of mineral yeast and fat mycelia, the biological process was utilized with success. According to this process, for which the "Vereinigte Chemischen Werke," Charlottenburg, have the patent, the formation of glycerin by alcoholic fermentation depends not only on the selection of certain kinds of ferment, but principally on certain chemical admixtures. The product thus obtained has been given the name of "protolglycerin" and is completely colorless and

ordorless. As regards the output, 6 tons of sugar give about 1.1 tons of glycerin. The process itself is very troublesome and expensive.

The purpose of the foregoing remarks has been to show how, and in what manner, endeavors have been made in Germany to supply the shortage of medical remedies. The newly manufactured remedies obtained from such raw materials as were available for the purpose still remain to be dealt with. This shall be done in a subsequent article.

FRENCH MILITARY NOTES.

Source: Reliable.

12 July 1919.

(11554.)

The following French troops are in Siberia: Omsk, 258 officers and men; Vladivostok, 18 officers and 101 men; Cheliabinsk, 72 officers and 800 men; Trvitsk, 3 officers and 170 men with artillery

Demobilization has been resumed in France; the classes of 1887, 1888, and 1889 will be demobilized by August 8, affecting men aged 30, 31, and 32. As a result of the conference held by Clemenceau and the undersecretary of state for demobilization with Foch and Petain, it has been decided that three additional classes, comprising 450,000 men, will be demobilized by the middle of August.

On June 15 the supreme naval council, which was suspended during the war, will meet again for the first time and will examine various projects for the organization of the French Navy during the transition period until peace is concluded. One prevision which has been suggested limits the absence of French naval units from French waters to from four to six months, save in the exceptional case of a naval campaign, the object being to relieve the burden upon each unit and to give experience to a greater number of men. The French naval reserve force, under the command of Admiral Le Bon, will comprise 2 squadrons of 6 battleships or cruisers each, 4 small squadrons of 6 torpedo boats each, and a group comprising 1 battleship and 1 cruiser, making a total of 38 warships.

The French losses in killed and missing on land and sea up to November 11 were 1,366,000; these figures were given to the Chamber on July 2 by Deputy Marin.

JAPAN'S FINANCIAL CONDITIONS—EXPORTS AND IMPORTS.

Source: Annual Report of Department of Agriculture and Commerce, Tokyo.

25 June 1919.

(11324.)

JAPAN'S FOREIGN TRADE DURING THE LAST 46 YEARS.

Year.	Commodities.		
	Exports.	Imports.	Total.
	Yen.	*Yen.*	*Yen.*
1873	21,635,440.85	28,107,390.03	49,742,830.88
1874	19,317,306.09	23,461,814.40	42,779,120.49
1875	18,611,110.61	29,975,627.62	48,586,738.23
1876	27,711,527.50	23,964,678.96	51,676,206.46
1877	23,348,521.60	27,420,902.95	50,769,424.55
1878	25,988,140.28	32,874,834.17	58,862,974.45
1879	28,175,770.19	32,953,002.39	61,128,772.58
1880	28,395,386.66	36,626,601.00	65,021,987.66
1881	31,058,887.93	31,191,246.02	62,250,133.95
1882	37,721,750.57	29,446,593.98	67,168,344.55
1883	36,268,019.59	28,444,841.78	64,712,861.37
1884	33,871,465.50	29,672,647.45	63,544,112.95
1885	37,146,691.43	29,356,967.92	66,503,659.35
1886	48,876,312.79	32,168,432.26	81,044,745.05
1887	52,407,681.15	44,304,251.69	96,711,932.84
1888	65,705,510.21	65,455,234.01	131,160,744.22
1889	70,060,705.82	66,103,766.60	136,164,472.42
1890	56,603,506.03	81,728,580.50	138,332,086.53
1891	79,527,272.34	62,927,268.38	142,454,540.72
1892	91,102,753.63	71,326,079.50	162,428,833.13
1893	89,712,864.59	88,257,171.71	177,970,036.30
1894	113,246,086.15	117,481,955.46	230,728,041.61
1895	136,112,177.92	129,260,578.28	265,372,758.20
1896	117,842,760.62	171,674,474.25	289,517,234.87
1897	163,135,077.32	219,300,771.64	382,435,848.96
1898	165,753,752.88	277,502,155.51	443,255,909.39
1899	214,929,894.31	220,401,925.99	435,331,820.30
1900	204,429,993.98	287,261,845.58	491,691,839.56
1901	252,349,543.10	255,816,644.70	508,166,187.80
1902	258,303,064.87	271,731,258.55	530,034,323.42
1903	289,502,442.51	317,135,517.92	606,637,960.43
1904	319,260,895.89	371,360,738.59	690,621,634.48
1905	321,533,610.00	488,538,017.00	810,071,627.00
1906	423,754,892.00	418,784,108.00	842,539,000.00
1907	432,412,773.00	494,467,346.00	926,880,219.00
1908	378,245,673.00	436,257,462.00	814,503,135.00
1909	413,112,511.00	394,198,843.00	807,311,354.00
1910	458,428,996.00	464,233,808.00	922,662,804.00
1911	447,433,888.00	513,805,705.00	961,239,593.00
1912	526,981,842.00	618,992,277.00	1,145,974,119.00
1913	632,460,213.00	729,431,644.00	1,361,891,857.00
1914	591,101,461.00	595,735,725.00	1,186,837,186.00
1915	708,306,997.00	532,449,938.00	1,240,756,835.00
1916	1,127,468,118.00	756,427,910.00	1,885,896,028.00
1917	1,603,005,048.00	1,035,811,109.00	2,638,816,155.00
1918	1,962,700,258.00	1,668,138,135.00	3,630,838,393.00

MEXICAN MARINE CORPS.

Source: Reliable.

19 July 1919.

(11714h.)

A Mexican marine corps has been organized, consisting of 300 men and 8 officers. The organization is to be stationed at Manzanillo, Colima. It is proposed to gradually increase it, so as ultimately to have a detachment of marines at every important Mexican port.

CONSTRUCTION AND REPAIR.

OFFICIAL FORECAST OF SHIPBUILDING IN JAPAN FOR 1919.

Source: Report Published in the Japan Advertiser, Tokyo.

29 May 1919.

(7410.)

JAPAN'S SHIP CONSTRUCTION WILL THIS YEAR TOTAL 622,949 GROSS TONS.

The peace slump has led to the closing of most of the small shipyards which sprang into existence during the war boom, but the larger shipyards are proceeding with their prearranged programs of construction though it is undeniable that their interests also have suffered considerably owing to the slump caused by the termination of the war.

From January to the end of April, 44 vessels of over 1,000 tons each, totaling 184,611 tons, were launched in Japan. According to the official forecast of the department of communications, 137 vessels of over 1,000 tons, totaling 622,949 tons, will be the sum of this year's construction. Of these vessels 30, aggregating 161,505 tons, are to be supplied to the United States. The following list shows particulars of this year's construction:

Builder.	Number of vessels.	Gross tonnage.	Builder.	Number of vessels.	Gross tonnage.
Kawasaki Dockyard	30	175,800	Naniwa Shipyard	3	5,200
Asano Shipyard	10	63,340	Yoshiura Shipyard	1	2,700
Osaka Iron Works, Osaka	10	62,700	Osaka Germaic & Shipbuilding Co	1	2,200
Osaka Iron Works, Innoshima	9	63,200	Ono Shipyard	1	2,000
Mitsubishi Shipyard Nagasaki	9	42,564	Tochigi Shipyard	1	2,000
Mitsubishi Shipyard, Kobe	1	5,150	Kidzugawa Shipyard	1	1,850
Harima Dockyard	7	40,735	Shinki Shipyard	1	1,500
Uraga Dockyard	7	33,110	Miyauchi Shipyard	1	1,450
Ishikawajima Shipyard	6	16,400	Toyo Industrial Shipbuilding Co	1	1,420
Uchida Shipyard	4	16,000	Fujima Shipyard	1	1,300
Yokohoma Dockyard	4	15,080	Harata Shipyard	1	1,300
Mitsui Shipbuilding Department	3	14,100	Kyushu Shipyard	1	1,250
Nitta Shipyard	6	13,150	Hotta Shipyard	1	1,200
Asahi Shipyard	3	11,400	Matsuo Ironworks	1	1,200
Toba Shipyard	5	10,400			
Fujinagata Shipyard	3	8,150			
Aizawa Shipyard	4	6,100	Total	137	622,949



UNITED STATES NAVAL RAILWAY BATTERY.



UNITED STATES NAVAL RAILWAY BATTERY.

Two shells hit this building used as a store for telephone material.



UNITED STATES NAVAL RAILWAY BATTERIES.

One shot from gun No. 1 of the United States Naval Railway Batteries, firing at Laon, France, struck in the center of the switch yard of that city. The force of the explosion was sufficient to utterly demolish a flat car which it struck, dig a large crater in the roadbed, tear up the tracks for a distance of more than 80 feet, raise up the wreck of the demolished car over 5 feet and throw it a distance of more than 15 feet, leaving it on top of an adjacent car that was standing on another rail. This picture shows a portion of the crater left in the roadbed by the explosion of the shell.

The hurried retreat of the Germans from the city of Laon under Allied pressure and continued bombardment by the Naval Batteries prevented the Germans from taking the time necessary for repairing the damage or removing the débris caused by the shells, and prompt examination of the shelled territory by United States naval officers resulted in the taking of this picture.



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ORDNANCE.

DEFENSES OF SALONIKI.

Source: Reliable. **29 May 1916.**

[The "redoubt" line of defense described herein is believed to be the strongest line developed during the World War.]

From a reporter of the New York World who has just arrived here from Salonika a general description was obtained of the defenses of the place and quite a detailed description of the latest type of French trenches which he states is the last word in trench warfare. This reporter was taken out to the French positions and spent a whole day on the French first line. He was treated with great courtesy and shown everything unreservedly. The French in fact seemed particularly proud of these latest defenses and anxious to show them off and explain their merits. The appended sketches have been made from very rough sketches and descriptions by the informant.

The defenses of Salonika total about 130 kilometers in length. The position lends itself admirably to defense of its natural strength. To the westward is the Vardar River, to the northward mountainous country, and to the eastward a network of lakes, swamps, and small streams, linking up with the coast at the Gulf of Rendina. The vulnerable part is the Valley of the Vardar, extending from the left bank of that river to the mountainous country. This, the most difficult part of the line, is held by the French, while the English hold the mountainous positions. The French are in supreme command, with Gen. Sarrail as commander in chief, and number about 150,000 men. The English number about 100,000 men.

The reporter was particularly impressed with the completeness, elaborateness, and permanence of the entire scheme of defense. He stated that they did not appear to be designed merely for the purpose of resisting an attack upon Salonika in the present war, but had distinctly the character of permanent works designed to last for years.

The general scheme of the defenses consists of two wide belts of wire entanglements running the entire length of the line. Back of these, instead of a continuous line of first and second line and reserve trenches as exists on the French front, there is a series of small

subterranean redoubts. These run the entire length of the front and are arranged in three rows, corresponding to the three lines of trenches in the old scheme. The advantages of the new arrangement will be touched upon later. It is said to be copied from the German system of defenses in the Labyrinth on the west front, a part of which was captured by the French. It is an interesting fact that this scheme resembles very closely the system of defenses I inspected on a visit to the French front in August, with the difference that on th French front the redoubts were in addition to the continuous line of trenches, and in rear of the latter. They were apparently added afterwards, and subsequent to the capture of the portion of the Labyrinth.

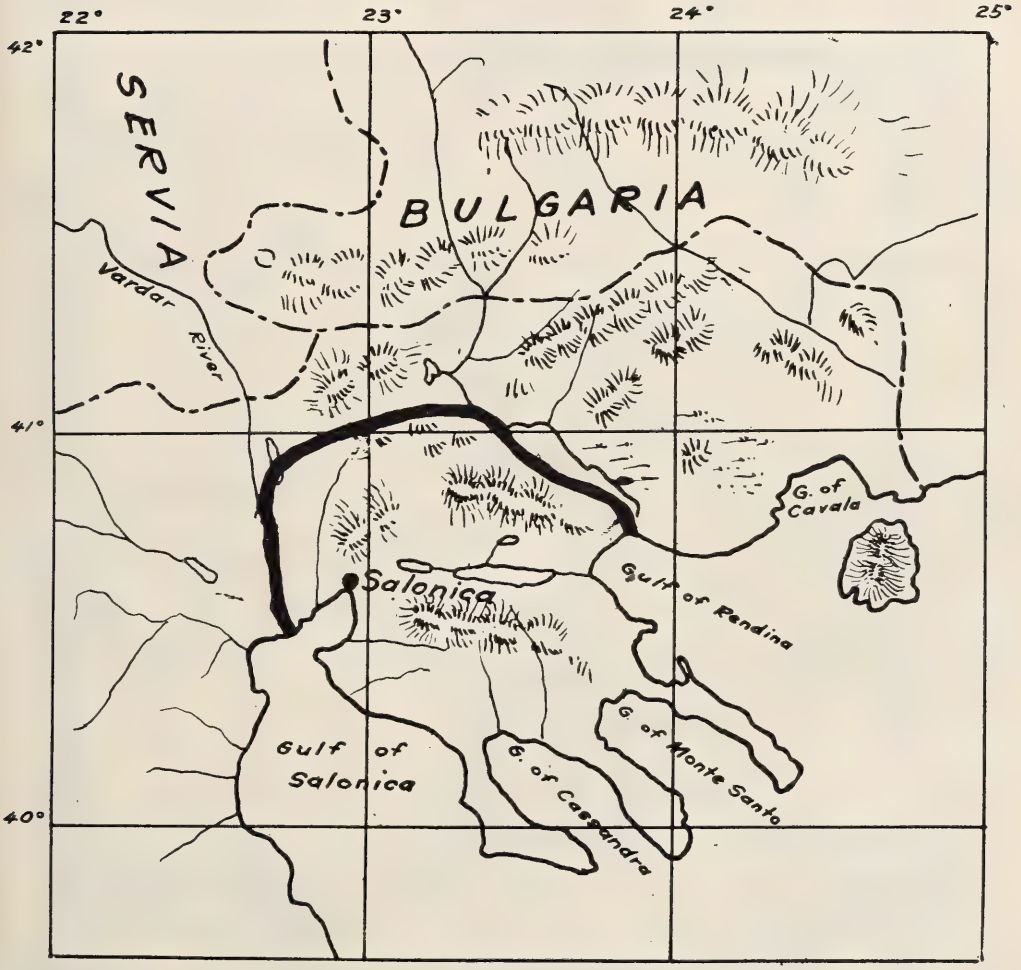
Two mitrailleuses are mounted in each redoubt, in different positions, depending upon the nature of the local terrain. About a mile in rear of the redoubts are the batteries of 75s, covering all sectors of the front, in the same manner as described in a recent report. Back of these in turn are batteries of 105s, 155s and 210s.

The two belts of wire entanglements are about 30 feet wide and the space between them is roughly the same. The wire is supported upon 10 rows of posts 4 feet high, the distance between rows being about 3 feet and the distance between posts in the same row about 5 feet. An enormous quantity of wire has been used. The wire is not stretched taut from post to post, but is in dense coils, attached to the posts, and forms a perfectly impenetrable jungle. Through this, from one side of the belt to the other, lead narrow diagonal paths for free passage of the defenders. Coils of wire, already prepared, are kept at the entrance of each path, and can be instantly thrown into them to block them up in case of attack. Under the entanglements also pass tunnels, which lead from the redoubts to small advance posts beyond, for delaying the enemy's approach. A machine gun is or can be mounted in these. The defenders remain here until the last minute, pouring a withering fire into the advancing enemy at close range, then dive into the tunnel, and get safely to the redoubt, blocking the tunnel en route.

The first line of redoubts is 75 to 100 feet in rear of the entanglements. The redoubts of the second line are staggered so as to cover the intervals between those of the first line. Those of the third line are similarly arranged.

Each redoubt covers an area of about 3 acres, is square in shape, and is surrounded by its own little barb-wire entanglement. It consists of an outside infantry trench, communication trenches running through it, and absolutely secure bombproof as a living room and refuge for troops, the mitrailleuse positions, the observation post of the commander, and a telephone station. Each redoubt is a perfectly independent unit, compact and self-sustaining, and has a garrison of one company or less, depending on the location and conditions.

Fig. 1. Map of the country around Salonica, showing its character; and indicating by the heavy line, the approximate position of the Allies' fortifications



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Fig. 2. General arrangement of the French system of redoubts employed at Salonica

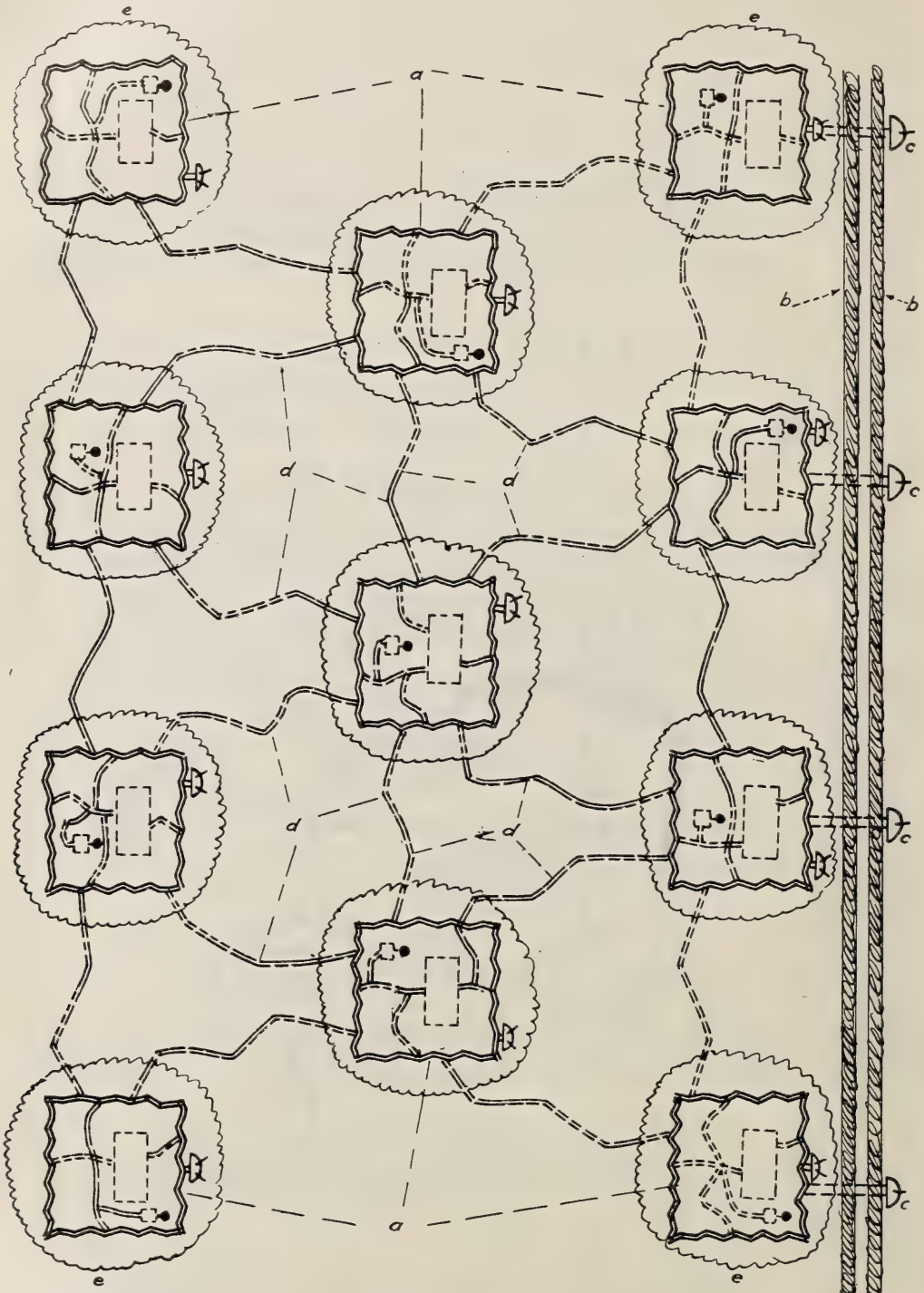
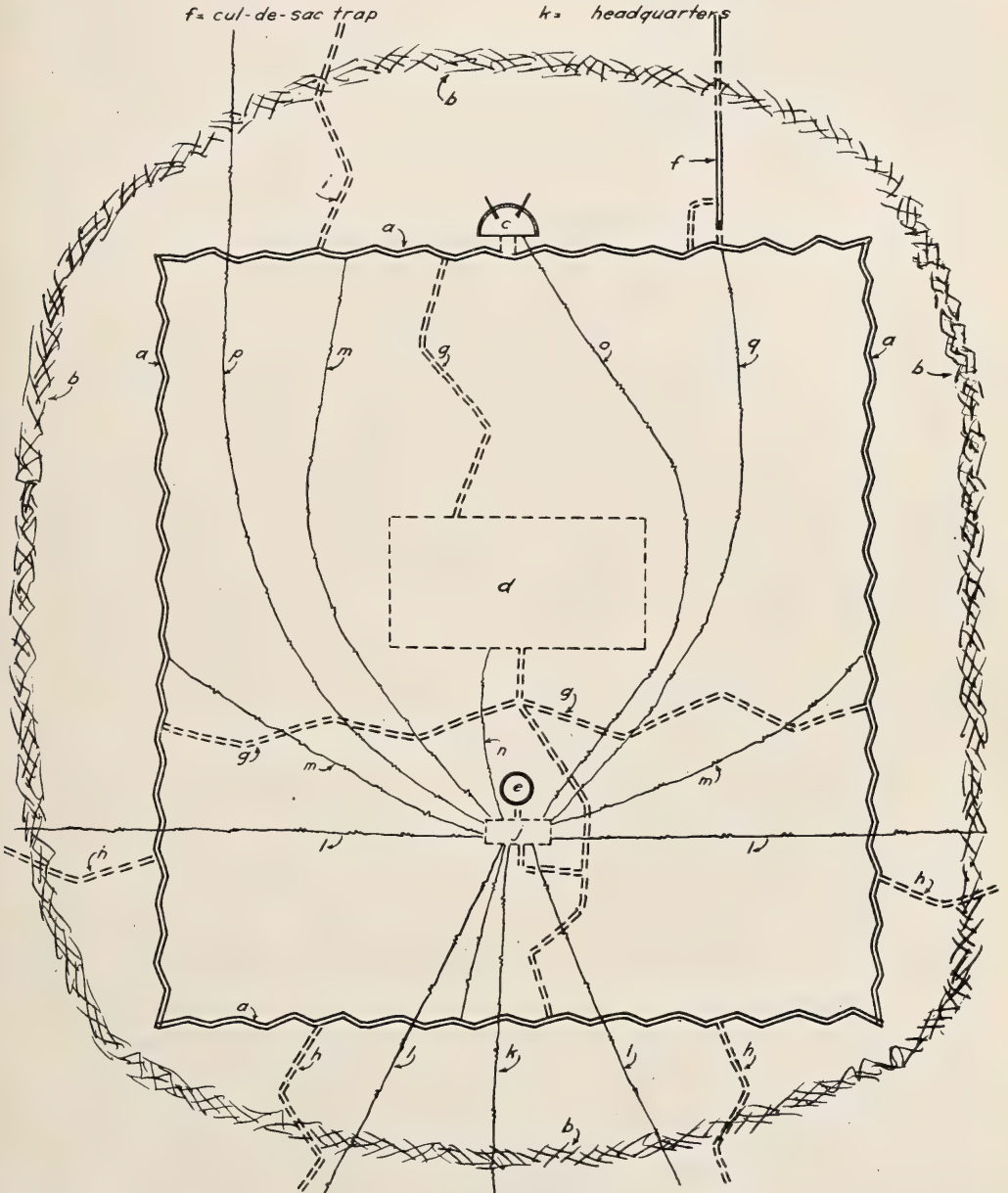


Fig. 3. Details of French Redoubt

a= exterior trench
b= wire entanglements
c= machine gun position
d= bomb-proof refuge + quarters
e= observation post
f= cul-de-sac trap
g= interior communication trenches
h= exterior
i= tunnel to advance post
j= telephone station
Telephones as follows to:
k= headquarters



l= adjacent redoubts
m= points of exterior trench
n= troops quarters & refuge
o= machine gun position
p= advance post
q= cul-de-sac

Throughout the entire construction no straight trenches or passages are employed, except as traps, as described later. Everything is zigzag, to prevent enfilading fire, and everything is below the level of the ground, except the hood of the observation post, and the parapet of the outside trench.

The entire redoubt is covered with natural soil or grass, and is almost invisible from aircraft.

The outer trench is deeper than the height of a man and very narrow. It is zigzagged. The parapet is loopholed for rifle fire, the loopholes being partially filled with steel plates of sufficient thickness to withstand rifle bullets.

Communication trenches zigzag diagonally across the interior of the redoubt from the opposite sides of the outer square, and zigzag trenches connect each redoubt to the adjacent ones.

The bomb proof, used as the living quarters for the troops and as a refuge against bombardment by artillery, is a large underground chamber, situated near the middle of the redoubt. It is cemented around the sides and roofed with steel plates supported on heavy scantling, and is 8 or 10 feet underground. It is believed to be impervious to the fire of everything except perhaps the very heaviest artillery. It is fitted up with benches, tables, cooking arrangements, etc., and can accommodate 50 men for sleeping purposes and the whole garrison for purposes of refuge.

The machine-gun position is situated somewhere on the front face of the redoubt, maybe in the middle, maybe at one corner, depending upon the topography of the terrain to be swept. If possible it is hollowed out of the slope forming the front face of the redoubt. It is cemented and roofed and faced with steel plates covered with natural soil and grass, and there are narrow horizontal slits for training and firing mitrailleuses. There is no access to it from the front. It is entered solely through an underground passage from the interior of the redoubt.

The commanding officer's observation post is located anywhere within the redoubt which is convenient. There can be no fixed practice in regard to its location, and this of necessity depends upon the undulations of the ground in the redoubt. It must have as nearly as possible unobstructed view in all directions, and therefore would likely be placed at the highest point. It is small and circular in shape, projecting slightly above the surface of the ground, cemented and roofed and faced with steel plates, covered with natural soil. Narrow conning-towerlike slits are its only openings above ground.

At a lower level, but opening from the observation post, is the telephone station. This is a small cemented room placed at such depth as to be practically immune from bombardment. It has a

switchboard with about 20 plugs. A perfect network of telephone wires runs throughout the whole system of defense. Each observation station is connected to several points in the outer trenches of the redoubt, to the bomb proof, to the machine-gun position, to the advance post beyond the wire entanglements, to adjacent redoubts, and to headquarters in rear.

Various traps and tricks are laid for the enemy in case he should succeed in passing the wire entanglements and threaten the main defenses. For instance, a fairly conspicuous straight trench is constructed running from the edge of the entanglement to the redoubt. But it is a cul-de-sac, and ends there in a blank wall. On the other side of this wall are placed two men with rifles or maybe a machine gun, in a small chamber having access only from the rear. The only opening from this chamber into the cul-de-sac is a narrow slit for firing. In places the trench tunnels through slight rises in the ground. At one of these places a heavy gate is concealed in the ceiling of the tunnel, supported on lugs. The lugs are operated by wires leading to the chamber at the end of the trench, and the gate can be dropped at the will of the defenders. When dropped it hooks itself securely under spring catches, and can not be raised by hand. A small passageway gives egress from the cul-de-sac to any of the defenders who may be caught therein during the fighting. This can also be securely closed by a heavy door.

When in the course of an assault a body of the enemy are decoyed in to this cul-de-sac by the retreating defenders, the heavy gate is dropped, and they are caught in a trap. The defenders slip out through the small passageway, closing the door, and the enemy are at the mercy of the riflemen or machine gun in the small chamber, which they can not reach.

My informant also observed wires leading through the redoubts, which he said were not telephone wires. Although he was not so informed and did not ask, he believes they were battery wires leading to subterranean mines, buried under the advance posts, machine-gun positions, and probably at various points under the trenches, for blowing them up if captured by the enemy.

Regarding now the advantages of the redoubt system of defenses as compared with the continuous line of trenches, they may be briefly summarized as follows from what appears to be obvious.

First. The length of trenches to be manned in repelling an assault is less than in the continuous line system. Since only the side of the redoubt facing the enemy need be manned at the first assault, and the spaces between the redoubts are not manned, either fewer men can be employed or a more concentrated line of rifles can be obtained. The reserves must be held ready to man the other sides, if necessary, just as they must be held ready in the other system.

Second. Each redoubt is self-contained and self-sustaining and constitutes a small stronghold independent of the rest of the line, which must be separately captured or reduced. In the continuous-trench system the line is more easily pierced, and if the enemy gets a foothold in a first-line trench at any point, by pouring men in at that point he can expand in each direction and may succeed in clearing the defenders out of their first line along any indefinite extent of front. In the redoubt system, if one redoubt is captured, the enemy's effort may be checked there and his gain localized and restricted. If the adjacent redoubts hold out they can concentrate upon the captured one with a good chance of rendering it untenable. In this system it is therefore much easier to eject an enemy who has secured a foothold in the first line than in the old system.

Third. Each redoubt is compact and the defenders concentrated, permitting much more direct and efficient supervision and control by the commanding officer than he could exert over the long thin extended line of the old system.

Fourth. The progress of an assault can be more easily kept track of by the commanding general in rear. The points along the line are more definitely marked. In the old system it might be very difficult to know how far in each direction the enemy had been able to expand laterally in a trench in which he had secured a foothold. In the redoubt system, headquarters is in direct communication with each redoubt, and it is known at once where the line has been pierced and extent of front lost. Adjacent redoubts report all this instantly to headquarters, and the commanding general, with accurate knowledge, can act with decision and coordinate the operations of his troops.

TACTICAL EMPLOYMENT OF MACHINE GUNS.

Source: Reliable.

22 February 1916.

The different regulations relative to the tactical employment of machine-gun units, not having up to the present been made the subject of a note covering the entire subject, it appears necessary to codify, in some way, the results of experience, and to unite in one general instructions the principles governing the employment of these units.

PROPERTIES OF MACHINE GUNS.

The increase in number of machine-gun units tends to make this arm the principal firearm of the infantryman.

Machine guns are principally characterized by: Their mode of action, which is exclusively by fire; the nature of this fire; their inconspicuousness.

Their mode of action.—The machine gun acting only by its fire can prepare an attack or repulse an offensive movement, but it does not conquer ground. The latter rôle is almost exclusively that of the infantry, which is fitted for crossing all obstacles.

It can therefore be said that, whenever it will suffice to act by fire, it will be well to employ the machine gun in preference to the infantry, preserving the latter for the combined action by movement and by fire.

The employment of the machine gun, therefore, permits economizing infantry and reserving a more considerable proportion of it for maneuvering purposes.

Fire.—The fire of the machine gun produces a sheaf, dense, deep, but narrow. The increase of the width of the sweeping fire gives to the sheaf a greater breadth, but then the density becomes insufficient and the effect produced is very weak.

The fire of the machine gun will then have its maximum power upon an objective of narrow front and great depth.

The infantry fighting normally in their lines, the preceding conditions will generally only be realized when these lines are taken in the flank.

The fire of the machine-gun parallel to the probable front of the enemy, that is to say, *a flanking fire*, must therefore be the rule.

Fire perpendicular to the front will be employed generally only on certain necessary points of passage, such as bridges, roads, defiles, cuts, roadways, communicating trenches, etc., that is to say, in a general way upon the places where the enemy is forced to take a deep formation with a narrow front, or again where he is in massed formation.

Inconspicuousness.—By reason of its small strength, the machine gun section can utilize the smallest cover, and consequently can hide from the enemy. The machine gun, therefore, has much more so than the infantry the chance to act by surprise and so to obtain considerable effect.

The opening of fire by surprise will be the rule, the machine gun will avoid revealing itself upon objectives not worth the trouble. *Flank action by surprise*, such are the two conditions that it will be tried to realize under all circumstances.

Employment of Machine Guns.

The grouping of the machine gun sections into companies assures the instruction of the personnel and the upkeep of the matériel; moreover, it favors cohesion and esprit de corps.

Companies of machine guns are not only administrative organs, but are likewise tactical units.

Fig. 4 Details of Wire Entanglements

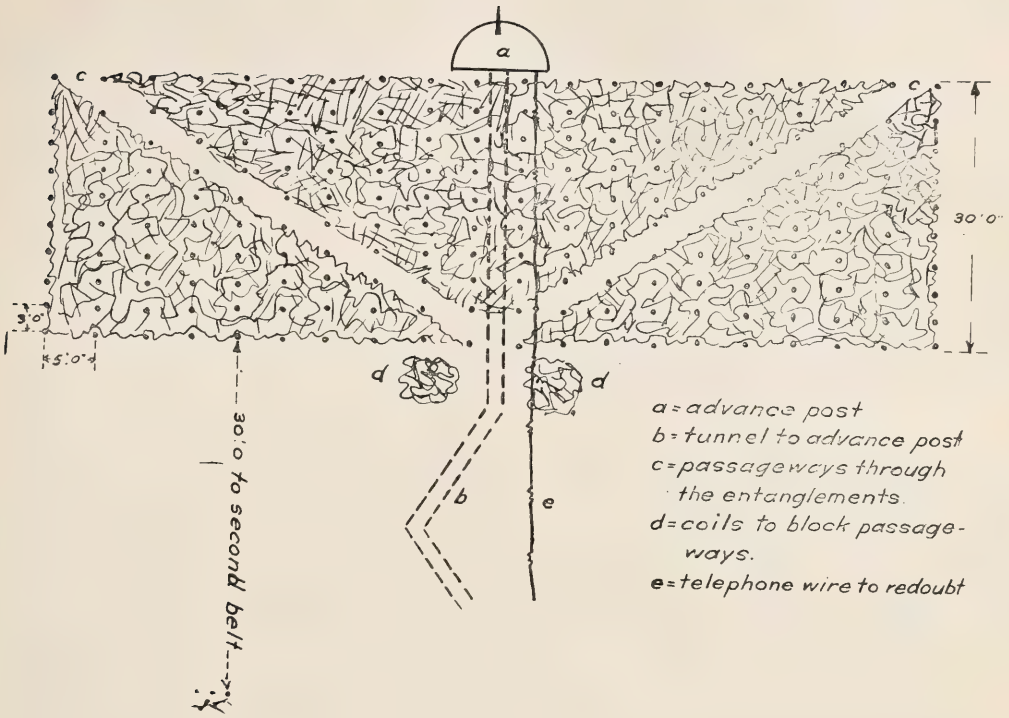
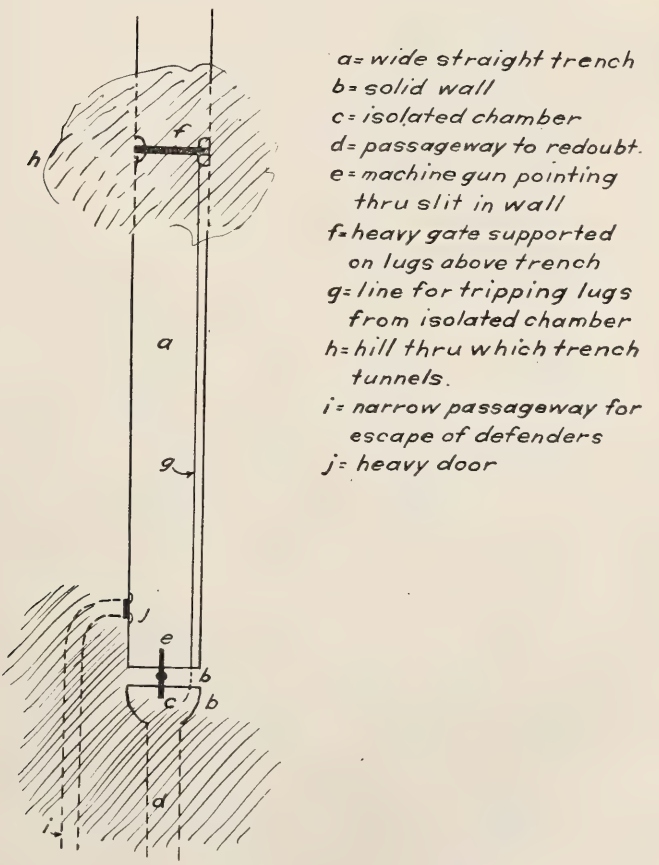


Fig. 5. Details of Cul-de-Sac



If, in trench warfare, they are generally employed by sections, in war of movements, on the contrary, they will have frequent occasion to fight united under the command of their chief.

Since too much care can not be taken to spare the infantry at the beginning of the combat, it is essential to push the machine guns forward to the heads of the columns, behind the elements of protection, and to place them at once under the orders of those who are to employ them.

For the same reason, the brigade companies of machine guns must not be considered as a "fire reserve," the brigade commander must divide them at once, without delay, between his two regiments in such proportions as he deems best.

When the brigade or regimental commanders do not give to the machine gun companies a special and somewhat independent mission, these companies must always be placed for the combat under the orders of the battalion commanders. The latter can place, likewise, one or several sections of machine guns under the orders of their captains.

Employment on the Offensive.

The principal situations in which the machine guns may be engaged are the following:

(*a*) *Reinforcement of a front momentarily stationary.*—At the beginning of an engagement the machine guns, supported by small elements of infantry, will cover very thoroughly the getting in hand of the main body, as the machine guns present to the enemy a line of little vulnerability.

During the combat they will assist in securing the possession of the ground previously taken, and will permit time to prepare the resumption of the forward movement.

(*b*) *Preparation of the attack.*—The power of machine-gun fire permits their use in completing the preparation made by the artillery, either by acting on the personnel or by opening breaches in the accessory defenses. At times even the machine guns will alone be charged with the preparation, in certain circumstances, where it will be necessary to act very quickly, i. e., pursuit, exploitation of a success.

Whatever may be the situation, only the concentration of intense fire on one or several points will obtain sure results.

(*c*) *Covering the flanks of an attack.*—Previously placed on the flanks of attacking troops, the machine guns will facilitate their debouching. They will then follow the advance of these troops, remaining on the wings, so as to be able to fire instantly on all points from which the hostile attack might debouch.

(*d*) *Occupation of an interval.*—Machine guns will likewise be employed to best advantage on intervals created intentionally or accidentally between two units. It is in this case a powerful parry which can be rapidly put in action by the commander.

Flank and surprise action will be sought in all cases. The personnel and the matériel will be protected as far as possible from the effects of fire.

Employment on the Defensive.

On the defensive, the employment of machine guns by flanking fire is still more necessary.

A defensive preparation of a position will not be complete until it has disposed the machine guns so as to provide along the front several successive fire barriers. The machine guns are thus constantly on the watch, especially at night, ready to stop by instantaneous fire all hostile attack.

In order that the barriers of fire thus organized can play their rôle at the moment of an attack, it is indispensable that the machine guns must not have been destroyed by the bombardment. Their protection must be provided with particular care. It will be provided by employing simultaneously the three following methods:

Place the machine guns under solid cover;
Make their emplacement invisible;
Echelon the machine guns in depth.

Shelter.

A sheltered cover for machine guns which is really solid requires considerable relief. In open ground the entrenchment will necessarily be spotted by the enemy, who will succeed in destroying it if he wishes to pay the price.

The machine-gun casemate must then be used only in cases where it can be hidden from the sight of the enemy, such as a counterslope, a position where it is possible to blend its relief with an accentuated slope of the ground, woods, brush, etc.

It is essential that the principal parts of the machine-gun casemate be prepared in rear. Only in this manner will the work be done solidly and rapidly.

While the machine gunners and their aids do the excavating, specialists prepare in rear the wooden parts for assembling. The latter are then transported to the position, and the casemate is established in one or two nights at most, hiding the work with the greatest care from enemy observation.

Invisibility.

The great importance of making the machine gun invisible has necessitated the making of fire emplacements outside of the shelter, but sufficiently near for the pieces to be brought out instantly. The

shelter, being intended only to protect the personnel, can then be dug just as deep as is desired and have an insignificant relief.

In the immediate proximity of the shelter will be the firing emplacements. The latter may be either protected against shrapnel fire with a light roof without apparent relief, or may be completely without cover on the parapet.

The firing emplacement can likewise be made by a simple hole in open ground, situated in front or in rear of the parapet. This hole, in the form of a well, will be connected with the shelter by a subterranean communication. The machine gun is placed in battery at the last moment at the very edge, either without any protection or preferably covered by a shield or behind a light parapet blended with a gently sloping terrain.

This hole, without parapet, will certainly escape hostile observation. The emplacements of this kind will be frequently employed in rear of the first line.

When a trench is built on a counter slope, an advantageous method consists in placing, forward of the crest, machine guns intrenched in this way, communicating with the trench by a subterranean passage under the crest.

Finally, machine guns may be placed in a tree under conditions analogous to those for observation posts.

The effort to obtain *invisibility* makes it necessary, on the one hand, to conceal all the communicating trenches leading to the firing emplacement, by making these communications subterranean; on the other hand, the necessity of multiplying the fire emplacements so as to avoid firing daily in the emplacements reserved for cases of attack.

Echeloning.

The natural tendency is to place all the machine guns in the first line, so as to establish in front of the trenches a fire barrier that can not be crossed. But, in case of a violent bombardment, the trenches of the first line will be torn up, and the machine guns for the most part destroyed. Those that have been spotted will surely be destroyed. The placing of too great a number of machine guns in the first line is therefore dangerous.

The object to be attained is to install the machine guns in conditions such that if the enemy penetrates our first line by aid of his bombardment or asphyxiating gas, his infantry, as it advances, comes under the fire of the machine guns echeloned previously in depth, under whose fire it must stop.

It is a matter not of sweeping a wide sector but of giving, over certain strips of ground, flanking fire which will cut down surely the enemy's waves when they push forward.

The commander will therefore divide between the first line and the terrain in rear the machine guns which he controls, organizing for each particular case a firing emplacement in accord with the surrounding ground and the purpose in view.

GENERAL RULES OF INSTALLATION.

Machine gunners must, under no circumstances, abandon their positions. They must, when necessary, allow themselves to be surrounded and defend themselves in their places to the end. In many cases the heroism and tenacity of a few machine gunners has permitted the rapid retaking of a lost position.

To provide for this resistance to a finish the machine-gun emplacements must fulfill the following conditions:

(*a*) Be surrounded by a wire entanglement of irregular trace and as invisible as possible.

(*b*) In the inclosure thus created have several firing emplacements in case one or more become useless.

(*c*) The personnel must have all the means for protection against gas, and have in addition, rations, water, and abundant ammunition.

EMPLOYMENT OF FIRE AND INSTRUCTION.

The more grazing the fire of a machine gun the more effective it is. This causes the principal employment of the machine gun to be at distances where the trajectory is flattest, i. e., under 800 or 1,000 yards.

However, the effort to obtain a grazing fire must not exclude long-distance fire. This latter will always be justified when directed on important objectives or necessary points of passage. For this fire to have some efficiency it is necessary to calculate the range with the greatest precision.

On the defensive, indirect fire will be employed sometimes to annoy the supply, reliefs, etc. To give results, a great quantity of ammunition will generally have to be expended.

All the officers and noncommissioned officers and as many men as possible must be capable of firing the machine gun, so that at the time of attack no gun will remain idle for want of personnel.

It is moreover essential to keep up the training of the personnel by having them fire at least twice a month, and if possible once a week.

RÉSUME.

Machine gun must be utilized in the greatest measure in *order to economize the infantry.*

Seek to employ them always in a flank fire.

Conceal them so as to get surprise fire.

Echelon them and *shelter* them, so as to avoid their premature destruction.

In regard to the machine-gun organization in the French Army, I have been reliably informed as follows, viz:

(*a*) Each regiment; 2 machine-gun companies of 4 sections each, or 8 guns; total, 16 guns.

(*b*) Each brigade (under the control of the brigade commander, and in addition to the regimental machine-gun companies); 2 machine-gun companies of 4 sections each per regiment in the brigade, 16 guns additional per regiment.

This makes a total of 64 machine guns per infantry brigade of two regiments (the French infantry brigade includes two regiments), or assuming the strength of the brigade to be 6,000 men, this makes the rate at about 10 plus 1,000 men.

It would appear, therefore, that the landing force equipment of machine guns supplied to ships is not in accordance with the experiences of the French Army during the present war, and, as a matter of fact, if the French infantry require 10 per 1,000 men, a landing force of bluejackets, to compensate for their inexperience, should be equipped with at least 15 per 1,000.

I have been informed that the French are now experimenting with an automatic rifle, and that for experimental purposes 24 of these guns have been supplied to certain designated companies. I expect to obtain further information on this subject.

I am also reliably informed that for some time past the French have been supplying luminous night sight to all machine guns.

GENERAL INFORMATION ON SMOKELESS POWDER.

Source: Reliable.

The smokeless powders actually employed can be divided into two principal categories:

(*a*) Powders with volatile solvent.

(*b*) Powders without volatile solvent.

They are all with basis of nitrocellulose with or without nitroglycerin, this last being mixed or not mixed with a nitrated hydrocarbon. Small proportions of slightly basic substances are incorporated in them in order to stabilize them, these substances can in certain cases play the rôle of solvents.

These powders, except the very quick-burning powders, called pyroxylated, and which are only used in general in nonrifled arms, have a tortoise-shell-like apperance; the nitrocellulose is in what is called the colloidal condition, like gelatin in plates, from whence the name of colloidal or gelatinized powders.

Principal Raw Materials.

a. Nitrocellulose or guncotton cellulose.

The cellulose which is best suited for nitration is that of the cotton of the cotton plant, which is in reality the purest, and comes principally from the United States, India, and Egypt. In general, only the waste of spinning and weaving is used, which is cheaper than the primitive or so-called "virgin" cotton, as well as the very short fibers which adhere to the cotton-plant seed, and which are not of use for the spinning mills; these fibers are known in commerce by the name of "linter" (lint, cotton fiber).

The cotton, before being nitrated, must be freed of all its impurities and especially of its oils, fats, and gums, by soda treatment, and if necessary by benzine, sulphide and tetrachloride of carbon; it is bleached besides with chlorine.

Instead of cotton, celluloses of soft wood or of various vegetables (poplar, fir, bamboo, alfa, etc.), may be used. These celluloses reduced to a pulp are bleached like that of the cotton; they are sometimes transformed into unsized paper sheets (blotting paper)[1] before dipping them into the nitration bath.

The nitrocellulose of wood is less pure and less stable than that of cotton, but in times of war this is of secondary consideration for powders which are to be rapidly consumed.

Nitration.—The cellulose is comparable to a carbon hydrate (that is to say, water and carbon) of chemical formula $C_{24}—(H_2O)_{20}$; the nitration consists in replacing a certain number of molecules of H by the radical NO_2.

The cellulose is moreover of alcoholic function, and the nitrocelluloses might accordingly be called nitrates of cellulose just as ethyl nitrate is formed with ordinary alcohol and nitric acid.

The bleached cotton is thoroughly dried and soaked in a sulphinitric mixture containing on an average three parts sulphuric acid for one part nitric acid in the monohydrate condition, with a certain portion of water; the smaller this latter is the higher is the degree of nitration.

In order that the powder may be more powerful it is of advantage to use the most nitrated nitrocelluloses, but they have different properties from the gelatinization point of view.

With the B powder, for instance, for which the solvent used in the gelatinization is alcoholized ether, which does not dissolve the gun cottons at the maximum of nitration, it is therefore necessary to manufacture two kinds of cotton; the one, highly nitrated, called CP_1 (cotton No. 1); the other, a little less and called CP_2 (cotton No.

[1] Same kind of manufacture as for paper.

2), but which is soluble in the solvent, from whence the name collodion cotton; it is also almost entirely soluble in nitroglycerin.[1]

For the nitration, several models of apparatus are used; small troughs, Selwig turbines, the Thompson apparatus, which are described in special publications.

Stabilizing.—The gun cotton on being taken out of the nitrating bath and washed, even until it reveals a basic reaction, does not have any stability, on account of the secondary products of the nitration which are badly defined and easily decompose. It is necessary to destroy these unstable products, and to remove the smallest traces of acid; to this end, the nitrated cotton is submitted to the action of boiling water made slightly alkiline, for a number of hours; it is this which is called the cooking or the stabilizing of the cotton.

This operation is continued until the cotton satisfies the so-called stability tests; that is to say, that heated to a certain temperature during a definite time, it must not give off acid vapors in appreciable quantities (Abel test at 65° or 75°, with paper reacting to iodide of starch; at 110°, with litmus paper; Bergmann-Yunck test at 130°, etc.)

The cotton is then reduced to a pulp; that is to say, it is chopped up very finely in machines called pulpers, analogous to those used for paper pulp.

Properties of the different types of guncotton used.—The CP_1 and the CP_2 are also called "insoluble" cotton and "soluble" cotton; their average percentage of nitrogen is, respectively: CP_1 : 13 per cent of nitrogen—CP_2 : 12 per cent of nitrogen.

A cotton soluble in ether alcohol with a nitrogen content close to that of CP_1 (12.7 to 13 per cent of nitrogen) can be obtained directly by a nitrating bath of well-determined composition; it is the cotton called pyrocollodion which gives directly a nitrocellulose, which can be used in the manufacture of powders of the type of B powders. In France it is found to be simpler to manufacture CP_1 and CP_2 separately.

If the concentration of the nitrating bath diminishes, less nitrated soluble cottons, called "nitric cottons," are still obtained. These are used in commerce particularly for celluloid, artificial silk, etc.

It must not be thought that a CP_1 or CP_2 type of cotton is a well-defined chemical composition; it is in reality a mixture of different types; thus, CP_1 always contains some soluble part, CP_2 frequently some insoluble; but for the manufacture of powders the proportions must not exceed certain limits fixed by the acceptance conditions; CP_2 contains also some part soluble in alcohol alone.

[1] The force of the two types of cotton determined the manometric bomb is about CP_1 : 0.700 kg.—CP_2 : 8.100 kg.

In the manufacture of B powders, the cotton, which is delivered to the powder works with about 30 per cent of water, is not dried, because it does not present thus any danger of manipulation; this water is afterwards removed by means of alcohol; the part soluble in this alcohol must not exceed a certain limit, otherwise considerable losses would result.

Another property of the soluble cottons which must be taken into consideration is the viscosity of their solution in the alcoholized ether solvent, which is determined by the rate of flow through a narrow hole.

This viscosity depends on different causes; the more the original cotton has been submitted to energetic treatments for the bleaching for example, the longer the time of cooking, etc., the less is the viscosity (i. e., the nearer the liquid state).

A great viscosity could give powders of our B type well gelatinized, but it would then be very difficult to eliminate the solvent—a limit is therefore fixed to this viscosity.

For the explosives called "gum dynamites" (nitroglycerin with about 8 per cent of nitrocellulose) it is of advantage to choose the cottons which are most soluble in nitroglycerin; the CP_2 is suitable for this, and also the nitric cottons; the great viscosity, due to the method of manufacture of this last type, may prevent the later separation of the nitroglycerin (exudation).

Thus, therefore, the intrinsic properties of the nitrocellulose depend upon numerous causes whose influence must be known in order to allow their use to be regulated.

Solvents.—Besides the alcoholized ether and nitroglycerin, the nitrocellulose has numerous solvents which can dissolve both the CP_1 and the CP_2, and which, for this reason, are called "complete solvents," the first kind being called "incomplete"; for example, acetone, methyl alcohol (especially the CP_2), the acetic ethers, amyl acetics, etc.; nitrated hydrocarbons obtained from toluene and xylene, etc., are also in general complete solvents; likewise nitromethane (CH_3NO_2); this has been experimented with, but has the inconveniences of being more volatile than the nitrated hydrocarbons.

The solvents like alcoholized ether, which have not any explosive property, must be eliminated so that the powder acquires its ballistic value; they are also called "inactive solvents." The others, like nitroglycerin, nitrated hydrocarbons, are an integral part of the powder; they are "active" solvents.

b. Nitroglycerin.

Glycerin: C_3H_5–$(OH)^3$, or CH_2–OH, CH–OH, CH_2, OH), is comparable to an alcohol; it is principally derived from greasy materials (stearate, oleate, margarate of glycerin).

To nitrate it, it is poured slowly into a sulphonitric mixture by using a special apparatus nitrator), which avoids all increase in temperature which might cause the explosion of the nitroglycerin. This manufacture is more delicate than that of the guncotton, but it is more rapid and the output greater, 225 per cent instead of 165 per cent, which makes employment economical.

Nitroglycerin (trinitric), $C_3H_5-(NO_2)^3$, is a nitric ether, it must consequently be carefully purified to assure its preservation and, in particular, it is indispensable to remove all traces of acidity from it. It appears more unstable than the nitrocelluloses, nevertheless this point is disputed.

The nitroglycerin has the inconvenience of crystallizing (freezing) at about 6° or 7° above zero, which may cause its separation from the nitrocelluloses (exudation); dinitroglycerin, which is obtained by an analogous process, and which only freezes at about 30° below zero, may be used in its place; it gelatinizes better than the trinitro, but it is less powerful and besides very hygrometric.

c. Ether and acetone.

The ether used is the oxide of ethyl, $(C_2H_5)^2-O$, or ordinary ether obtained by the action of sulphuric acid on ethyl alcohol, in the apparatus called "etherizers," which are erected in almost all powder mills.

Among the other usual volatile solvents, there is only acetone (C_3H_6-O), which has been especially largely used. It is obtained by the distillation at about 400° of acetate of lime, and in certain fermentations of amylaccous matters, where it appears at the same time as various alcohols.

Manufacture.

a. Powders with volatile solvents.

They are of several types:

First. Powder with base of nitrocellulose alone.—(Type of the B powders:) Guncotton must be freed of the water that it contains, otherwise the solvent would only have slight action on it; instead of the drying in a store as was done formerly and which was not without danger; this water is removed by alcohol at 95°. It is this which is called the "dehydrating" of the cotton, an operation which is performed either in turbines or by means of hydraulic presses.

As the solvent (ether with 35 to 45 per cent of alcohol) itself contains alcohol, it will be sufficient consequently in the proportion of alcohol of the solvent to be used to take account of that retained by the cotton after dehydration (about 30 per cent).

The respective proportions of CP_1 and CP_2 are determined according to the percentage of soluble cotton used for the kind of powder to be manufactured (25 to 50 per cent); this percentage of soluble part is increased with the thickness, so as to improve the gelatinization of

the thick powders. These different elements are varied, moreover, according to the different qualities of the cottons and even according to the season (because of evaporation), from the experience acquired, and in view of regulating the manufacture as much as possible.

In order to realize the mixture and obtain the gelatinization the cotton is mixed with the solvent in apparatus called "mixing machines" similar to those of bakers (mixing machines: Chandel-Page with straight arms; Werner-Pfeiderer with helicoidal paddles).

The paste thus obtained, which is in reality a nougat of CP_1 in a more or less thick solution of CP_2, is subjected to a great pressure in hydraulic presses, provided with a nozzle in their lower part. This nozzle has a rectangular slit called "draw plate" or "drawing rule," because it consists of two rules set at a definite distance apart, according to the thickness which it is desired to give to the powder.

The paste comes out then in a continuous strip having little consistency, and whose solvent must be removed. The strips placed on sticks are then placed in hoppers of sheet iron in which a current of heated air is passed by means of a "temperature changer." This air volatilizes the solvent and goes into a refrigerator with liquid carbonic acid where the fumes of ether and alcohol are condensed; the air, heated again, passes over the strips and goes again to the condenser. This phase of the manufacture is called wringing with solvent recovery.

The strips, having become consistent, are cut into grains or into small disks in special machines; they still contain 15 to 25 per cent of solvent, which makes them unsuitable for firing; they must still be dried until the amount of residual solvent is as small as possible.

(The powders in thin strips were fluted at the moment of cutting so as to improve the ignition, and to increase their elasticity in order to facilitate the making of the packets; to-day this fluting is done away with in view of simplifying the manufacture, and also on account of the very small advantages which it offered.)

With thin powders, a simple drying in a stone heated to about 50° may be sufficient to lower the proportion of the residual solvent to a percentage permitting the powder to acquire its ballistic properties; but, for thick powders, this mode of operation would require a length of drying inconsistent with the output required of the plant. Soaking in hot water[1] is then used, where the temperature occurs at the same time as osmose phenomena between the water and the solvent. These soakings must be preceded, nevertheless, by a slight drying so that the action of the water does not decolloide (degalitinize) the powder, if it were, as is said, too "green."

[1] The temperature of the water is variable according to the type of the powder, but in any case it must not exceed 80°.

For the very thick powders these soakings must be separated by dryings, so that the manufacture of these powders is very much longer than that of thin powders.

In the elimination of the solvent, the thickness of the powder decreases by almost half in proportion to that of drawing out; besides, and above all for thick powders, the strips have a tendency to warp during the soakings. In order that this warping may not make the manufacture of the charges difficult, it is necessary to press the strips against each other, as much as possible, in the special divisions, so that they obviously retain their original plate shape.

The solvent which has been recovered during the drying is used in the manufacture of ether; the alcohol which was used in the dehydrating and which contains some water is rectified so as to allow it to be used again. In reality, only a small part of the solvent is recovered; and, with the present installations, it is necessary to count upon a real expenditure of a liter and a half of alcohol per kilogram of powder, including therein, however, the amount necessary for the manufacture of the ether.

At present an attempt is being made to recover the solvent from the soaking waters which contain a considerable proportion of it, as well as that which evaporates at the moment of drawing out in the localities where the presses are installed, and by utilizing the facility of absorption of the ether and alcohol vapors by certain substances, for example, sulphuric acid, cresol, etc.

Second. Nitroglycerin and nitrocellulose powders.—When it is desired to use the nitroglycerin with a cotton of the CP_1 type, or else in small proportions (below 40 per cent), it is necessary to make use of a common solvent, otherwise the gelatinization could not be obtained. Thus for the English cordite, which is solely with base of CP_1 and nitroglycerin, the solvent is acetone which dissolves both the CP_1 and the nitroglycerin.

This cordite was originally composed of CP_1, 37; nitroglycerin, 58; vaseline, 5; to-day with a view to decreasing the heat given off and consequently the wear of the guns, the proportion of nitroglycerin has been reduced to 30 per cent; this is the MD cordite (modified).

Its manufacture is similar to that of the B powders, but the cotton must be dried, because it can not be dehydrated by means of alcohol, the solvent does not contain any; moreover, like all the nitroglycerin powders, it can not be dipped in hot water in order to eliminate the acetone, the water displaces the nitroglycerin. It is therefore necessary to submit it to prolonged dryings, the better the solvent dissolves the nitrocellulose, the more difficult it is to eliminate it, that is to say that it is more complete.

Its name of "cordite" comes from its shape; it is drawn out in cylindric sticks (cord) whose diameter varies according to the slowness to be given to the powder.

Powders with nitroglycerin base can also be manufactured, but with a small amount (15 to 25 per cent), and with a mixture of insoluble and soluble cotton (CP_1 and CP_2) the solvent being alcoholized ether, the cotton may then be dehydrated with alcohol like the powders B.

Third. Powders with nitrocellulose base and complete solvent.— The English cordite is a complete volatile solvent powder; complete solvent powders of the type of those of B powders can also be obtained, that is to say with alcoholized ether and with bases of nitrocellulose only (without nitroglycerin), by utilizing pyrocollodion.

The solvent is more difficult to eliminate, the soakings having less action on the colloid; the dryings must be accordingly of long duration and moreover moderate, so as not to change the tubular shape, especially when the tubes are a little long.

In present circumstances, when the manufacture must be intensive, the above conditions are disregarded and the powder, whatever its shape, is generally subjected to energetic soakings.

It is to be remarked that the matter of our powder B can also be drawn out with special drawing plates of tubular or multitubular form, but the tubes obtained are more brittle than those obtained by using pyrocollodion, or an almost entirely soluble cotton.[1]

Acetone also gives with nitrocellulose only, although it is a complete solvent, pieces of little elasticity; nevertheless, in the use of pyrocollodion, when it contains too much insoluble following a defect in the manufacture, a little acetone is added to the alcohol-ether solvent.

b. *Powders without volatile solvent.*

The original type is the balistite, CP_2, and nitroglycerin, in perceptibly equal proportions, 50/50. In order to manufacture the paste, the nitroglycerin is placed under water into which the cotton (damp) is introduced through a sieve; the mixing is effected with compressed air. The cotton absorbs the nitroglycerin, and the whole assumes the appearance of a granulous matter, which is wrung in order to remove the excess of water; it is then left to settle for several days during which the gelatinization of each grain improves.

This matter is repeatedly passed under a steam-heated rolling machine called "reducer," which, in short, finishes the gelatinization; a horn-shaped sheet—soft when hot—is thus obtained, and it

[1] The use of these types of cotton appears also to give a more elastic powder than our B powders with a slightly superior density (1.6 instead of 1.5).

only remains to bring it to the thickness corresponding to the type giving the desired ballistic results. It is passed again through the rolling mill equally heated and called "calandre" or "finisher," which reduces it progressively to the desired thickness.

The sheet obtained is then cut into small disks (strips) or most often into square grains, with a special machine type "massicot" or guillotine; the powder is then finished, it does not require drying, the water having been eliminated by the rolling.

It is of advantage to lower the percentage of nitroglycerin in order to decrease the heat given off by the powder in the arms; but the above mode of manufacture, which is simple and rapid, can only be employed if this precentage does not go below 40 per cent, otherwise the matter is too hard to be rolled.

If it is wished that this percentage does not exceed 40, then it is necessary to replace a part of the nitroglycerin by another non-volatile solvent, and as active a one as possible, so as not to reduce the power of the powder. As a new solvent nitrated hydrocarbons can be used which are without action in the cotton, and which generally dissolve both CP_1 and CP_2.

It is thus that the ballistite called "alternated" is at present manufactured, with the following propositions: CP_1: 30, CP_2: 30, dinitrotoluene: 15, nitroglycerin: 25.

The dinitrotoluene may be replaced by dinitroxylene, all the nitroglycerin can even be suppressed, trinitrotoluene (tolite) only being used.

It is necessary to glaze the grains of nitroglycerin powder; this glazing hardens the surface, and it is possible that it may delay the exidation of the nitroglycerin. In Germany it is done with a little graphite, which, while giving more slippery grains, may increase moreover the effect of the glazing proper, as regards the exudation.[1]

[1] This glazing, moreover, prevents the grains sticking to each other. The glued grains can, in fact, act at the time of combustion, like a powder of a greater thickness.

Errata in Bulletin No. 5, of 15 May 1919: On page 17, the sixth line from bottom of page, should read "Parker, Commander Halsey Powell, U. S. N., 3 August 1917. Possibly seriously damaged." (Adm. Class.)

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Number 9—1919

OFFICE OF NAVAL INTELLIGENCE

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MONTHLY INFORMATION BULLETIN

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15 SEPTEMBER 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 September, 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

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NUMBER 9—1919—15 SEPTEMBER, 1919.

FOR CONVENIENCE IN ROUTING.

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ORDNANCE.

INSPECTION REPORT OF EX-GERMAN BATTLE CRUISER "GOEBEN."

Source: A report made by Commander W. R. Van Auken, United States Navy.

20 May, 1919.

The ex-German battleship *Goeben*, now the *Sultan Jawus Selim* of the Turkish Navy, has the following armament: Ten 28 c. m., 50 caliber; ten 15 c. m., 45 caliber; eight 8.8 c. m., 45 caliber; and three torpedo tubes. She is equipped with four Parsons turbines, 24 boilers of the Thorncroft type, and has a battle speed of 28 knots. In her present condition, with three holes in her side, from mine explosions and the opposite compartments filled to keep her on even keel, her maximum speed is 20 knots.

History of the "Goeben."

In April, 1914, the *Goeben* and the *Breslau* met the Kaiser at Pola, Austria, and convoyed him on the *Hohenzollern* to his palace at Corfu, Greece. He spent the month of April, 1914, in Corfu. After this the *Goeben* and the *Breslau* escorted him back to Pola, Austria, where he took a train to Berlin. The *Goeben* remained in the Adriatic during May and June and early part of July, 1914. In August, 1914, when war was declared between France and Germany and England and Germany the *Goeben* was at Pola. She thereupon proceeded to Messina for coal. Afterwards she went to Algiers and bombarded that place with her forward turret. This turret is now called "Algiers." Leaving that port she proceeded to Constantinople, via Messina, and escaped from the British cruisers. The *Goeben* and *Breslau* arrived safely in Constantinople, Turkey, and interned. Most of the German officers and crew remained aboard of her. After Turkey entered the war the *Goeben*, under the Turkish flag, was under the command of Capt. Ackermen, who remained in command from 1913 until the armistice in 1918. Of the crew of 1,300 men half are Germans and other half are Turks. Of the 40 officers on board half were Germans and the other half Turks. The executive officer of the *Goeben* was a Turkish naval officer and now is in command of the *Goeben*. The *Goeben* and *Breslau* after Turkey entered the war spent a great deal of time in the Black Sea. It was considered that

she could be better protected there from submarine attacks and raids from the allied forces. In the Black Sea in an engagement against the Russian fleet, under Admiral Kolchak, the *Goeben* was hit by two high explosive shells, one in the No. 10 six-inch gun compartment where all the crew were killed, and the other in the port side, base of the smoke pipe. Neither of these shells did any serious material damage to the vessel. At this time the *Goeben* struck three mines, necessitating a reduced speed to 20 knots. She thereupon left the Russian Fleet and went to Constantinople for repairs. As there was no dock there which she could use, it was necessary to sink caissons and thus repair the holes in her side. Three months were required to do this. While at anchor in Constantinople the *Goeben* laid off the Sultan's palace. In 1917 and 1918 the *Goeben* spent much of the time in the Black Sea. The summer of 1917 she made a short cruise toward the entrance to the Dardanelles with the Kaiser on board. In September, 1918, the *Goeben* and *Breslau* passed through the Dardanelles with the idea of bombarding Mudros, which was a British naval base on the island of Lemnos. In this raid she sank two or three British monitors. Not knowing the exact location of the British mine fields to the southward and westward of the Dardanelles the *Goeben* and *Breslau* steamed over part of the mine fields. The *Breslau* struck a mine in daytime and was sunk. The *Goeben* circled around her, lowering boats, and rescued some of the officers and crew. Later the *Goeben* struck three mines. She thereupon abandoned her plan to attack Mudros and returned to the Dardanelles. In proceeding up the channel at the Narrows, Nagros, her captain and navigator, made a mistake in a buoy. The ship was headed to the right of this buoy instead of to the left. As a result, the *Goeben* grounded on the sand spit at that point. Turkish officers did not feel that there was any excuse for this error. A radio message in English was broadcasted that she had been grounded purposely. Then vessels were used to dredge out the sand on the sides of the *Goeben* and she was finally freed. She laid off Constantinople until the armistice with Turkey was declared in October, 1918. No repairs have been effected upon the vessel since the three mine explosions took place. A detailed report of these explosions, their damage, and how remedied is described in this report. In November, 1918, the *Goeben* was sent from Constantinople to the Gulf of Ismid, where she now lies.

General Condition.

Although there are only 125 Turkish sailors and 25 Turkish officers on board the *Goeben*, to care for her, she appears to be in quite excellent condition. No fires are kept in the boilers. The only coal used is for the galley. The decks are very clean. The officers' quarters are especially in immaculate condition. All guns, mounts,

fire-control apparatus, magazines, and shell rooms are in excellent condition. The ship does not look like a vessel which has seen four years of war.

General Notes.

(1) Was outranged in Black Sea engagements by Russians.

(2) Did not fear mine explosions.

(3) Maximum number of times any one gun fired, 74. Guns never removed during the war.

(4) Coal scarce and of poor quality.

(5) Germans and Turks did not fraternize.

(6) German officers sometimes wear the Turkish fez.

(7) Kaiser very proud of *Goeben*. His visit, however, was mainly to cheer up the Turks and keep them in war.

(8) Little shore leave and few diversions during the war.

(9) One Turk officer on *Osfriesland* in Jutland battle said "visibility" did not bother Germans; obtained good range-finder readings; fired single barreled as fast as guns loaded; his ship not damaged; 200 men killed; *Seydlitz* hit 28 times; said whole German fleet was out in spring of 1918 to raid Fourth British Battle Squadron with Norwegian convoy. He said that the *Queen Mary* was sunk by the *Kronprinz*, the *Indefatigable* by *Moltke*, and the *Invincible* by the *Kaiser*. He attributed quick and accurate hitting of Germans to stereo range finders and fire control. He further said that trouble among German crews began in September, 1917, due to lack of food, and that since then up to the armistice neither officers nor men had good food. He did not seem to regret that the German fleet had surrendered. This officer was one of the Turkish officers who were kept in the High Seas Fleet for instruction; there were also a number of men.

(10) In Black Sea engagements with Russians hit by two high-explosive shells only; no material damage. Struck three mines. In sortie on Mudros, 1918, struck three mines. No damage other than this done to *Goeben* during the war.

(11) The present captain of *Goeben* and his chief engineer appear to be very keen.

Summary of Observations.

(1) Under ordnance, the noteworthy features appear to be:

(*a*) Control from periscope by "follow-the-pointer" to searchlight controller. This Siemans-Holske system appears rugged and accurate.

(*b*) Battle order visual indicators.

(*c*) Stereo range finders, considered by Germans much superior to Zeiss coincidence type for poor visibility conditions.

(*d*) Safeguarding of magazines.

(*e*) Averaging machine for range-finder readings.

(*f*) The ability to fire submerged torpedoes at 28 knots speed.

(*g*) Use of ladder and halving method in spotting. The vertical method considered by Germans to be difficult under poor visibility conditions.

(*h*) The use of single-barreled salvos with about 15-second salvo intervals.

(*i*) The use of a brass cartridge case in addition to four powder bags in each turret gun. No jammed cases or misfires ever reported on *Goeben*.

(*j*) The fact that burst of Russian shell in No. 10 6-inch guns compartment did not damage mount or compartment or burst other cartridge cases.

(2) Construction and Repair.

(*a*) Method of insuring water-tightness of ship in design.

(*b*) The fact that the *Goeben* now illustrates what a modern battleship should stand from mine explosions.

(*c*) Subdividing torpedo compartments instead of having one large torpedo room.

(*d*) Method of draining water leaking through upper deck hatches.

(*e*) Size and equipment of central station to be used by navigator in action with chart room adjacent.

(*f*) Use of whistles at each voice tube to call other stations.

(*g*) Design of a tin model to scale about 12 feet long with outer plating removed for instruction purposes aboard each ship in studying compartments and systems of drainage and flooding.

(*h*) Drawings of compartments for use in central station in guarding water-tight integrity of ship. These are made in colors, laid flat, and enable the executive officer to accurately locate an injury and take quick action to remedy it. The use of tin model mentioned in (*g*), the diagrams for central station and features of design and organization to keep the ship afloat or on even keel, are the paramount points of the *Goeben*. In this there is much to be learned by all allied navies.

(*i*) Location of signal stations behind armor.

Guns and Breech Mechanism.

Thirty c. m. Krupp uniform twist Krupp sliding breech plug. All guns in good condition. Were not removed or relined during the war. According to report, the maximum rounds fired from any one of these guns was 74. It was reported that very little erosion was found. All breech mechanism was in excellent condition. They are fitted with electrical and percussion firing, using brass cartridge cases and bags.

Turret Mounts.

Examination of No. 1 turret showed that there was plenty of room for the service of the guns. The impression gathered in this type of two-gun turret is that it is larger than the two-gun turrets of the *Delaware* class. Each gun is mounted in a slide whose trunnion rests in the trunnion seat of a deck lug. These did not appear to be especially heavy or have any feature over our own design. The sight mount was of similar design to that of the *Michigan* class, except that instead of the periscope projecting through the sides of the turret, it was in a vertical position through the face plate of the turret. The sight radius on these guns was not over 3 feet; the arm being secured directly to the trunnion leading straight aft to the bracket in sight elevating arc. At the left of No. 2 gun was a pointer's periscope—variable power Zeiss. In a small pocket between the two guns was a pointer's periscope for use in firing guns double-barreled; next to this was a trainer's periscope for training in the turret. At the right of the right gun was a pointer's periscope. It was possible to train the turret from only one position, 1.5, the central compartment noted. These Zeiss periscopes and, in fact, the design of the sight mount is quite similar to the Skoda design, which was described in the report of the Austrian dreadnought *Prinz Eugen.* At each pointer's station it is also possible by means of a mechanical clutch to connect mounts for double-barreled firing, and to fire these guns from either the right or left gun. The methods of percussion firing from the pointer's station is quite the same as in the Austrian ships. It is simple and appears to be very efficient. While method of connecting guns for double-barreled firing is simple and can be quickly done, it does not appear that there are any special means taken for exact alignment of the two guns. I understand that these guns have been fired double-barreled a very few times, but that the results were quite good. Their ordinary method of firing was single barrel, and for one very good reason, that both guns can not always be simultaneously elevated, because the hydraulic power for elevation was not sufficient. They, too, thought they could fire more rapidly by loading the guns separately.

There is a fore and aft bulkhead partially separating the two guns. The opening to ammunition hoist is about in line with the rear face of the gun. All the space abaft of the two guns is open. The turret officer's booth, if it can be called such, is abaft the trainer and next to the range-finder operator, forward in the turret between the two guns. The turret officer has few switches or communications to attend to. He keeps in communication with telephone and voice tubes with the fire-control party and to his magazine and shell room.

The system of recoil and counterrecoil is hydropneumatic. No springs are used. The power for elevation is hydraulic, with train electric and ammunition hoists hydraulic.

There is no provision on the turret mounts for director firing in elevation. The pointer can not see the target from the turret. There is no method of accurately controlling the turret. The *Goeben*, however, never fired under bad conditions of sea or weather, and was generally alone only with the *Breslau*. The turret could train or be put onto within one minute and a half of arc with the Sieman-Holske design of " follow-the-pointer system " from the top or control station.

There appeared to be nothing radically new or ingenious in the method of mounting these guns, nor any special provision or instructions for accurate alignment, calibration, or refinements which would increase the efficiency of the turret. However, it is understood that the accuracy of each turret was good up to a maximum range of firing at 17,000 yards. It appears that in design of turret mounts (two guns) the Germans and the Austrians followed along about the same lines. The following is a general description of loading from level position: Plug opened by hand, no gas ejection device; what gases come out of the turret are by means of the ventilating duct, partially forced through opening outside of the turret; the gun is not sponged out; the shell, which has come up in a flame-proof car, rolls out from the hoist to a loading tray which projects from each turret platform to the gun. Then, by means of a hand-operated rammer, controlled by two purchases (a rather clumsy affair), three men ram the shell home. After this, three bags of powder come up and are rammed in by the rammer; finally the brass cartridge case, which is also rammed in. Then the plug is closed, the guns brought to firing position by the pointer. It is said that the whole operation required only 14 seconds; but this is believed to be a good rather than an average performance. The method of handling the bags and rammer is crude. It is possible for each hoist to supply both guns.

It was a great surprise to find that in this type of 30 c. m. gun bags were used in addition to the brass cartridge cases. Using both the cartridge cases and bags greatly complicates the loading. Also the absence of an efficient gas ejection device is especially noticeable. If the *Goeben* were firing into the wind, it is believed that her turret would be filled with gas each time the plug opened, and would seriously interfere with the service of the gun and the personnel of the turret. The deck abaft the gun has excellent treads to prevent men slipping when loading the guns. It is also noted that no lights or important turret material was secured to the armor. A hole in the rear end of the turret provided means of getting rid of the brass cartridge cases.

Broadside Mounts.

The broadside mount for the 15 c. m. guns were hydropneumatic recoil, Krupp design, and contained no special new features. They are equipped with "follow the pointer" system in train, accurate to three minutes in arc, and had good voice tubes and telephone communications. Each gun was in a separate compartment; a small peephole through the face of the bulkhead enabled one gun's crew to see and communicate with the other. (By this means, in the Black Sea engagement, the No. 8 gun's crew looked through the hole and saw all of No. 10's crew dead and gun out of commission; this enabled them to report to the executive officer in central station this fact.)

Fire Control.

(*a*) Range finders.

There is one range finder for each turret. About 4-meter base. In No. 1 turret it was a Zeiss range finder, coincidence type (this was the only range finder left on the ship), and when the operator was found and asked by the captain of the ship to put it in adjustment he said that one of the prisms had been taken out and it could not be used. (He was the range-finder operator of this range finder during the war; a Turkish P. O., but in appearance and actions a true German.) This range finder had about 6° train in azimuth, independent of the turret. This mount brought out no new feature. In some of the other turrets it was not known whether they used the coincidence or the stereoptical type of range finder. In the forward and after control stations the stereoscopic range finders were used. They were about 4-meter base instruments, well mounted, the operator comfortable, periscope eyepiece, and generally the same in principle as the 3-meter stereoscope range finder seen on the German submarine *U–139*. The "follow the pointer" in train transmitter was connected to the range finder so that when the range finder picked up the target all turrets, broadside guns, and searchlights could quickly get on the same target. The range finder and azimuth train very easily and smoothly. These features of the mount were remarkably efficient.

The German crew had removed the stereoscopic range finder from the ship before the *Goeben* was interned. They depend on the stereoscopic range finder principally, and for that reason took them back to Germany, so that none of their enemies could see them. There were no range finders in the tops.

Communication and Transmission Instruments.

The telephones consisted of the ship's control type with double earpiece, operating through the transmitting station; then there was a fire control small receiving headpiece. In using the voice tube, which

varied in size according to the distance of communication, small mouth whistles were used to call up the other end of the tube quickly, instead of electric bells. There is nothing new in the telephones on the *Goeben*. The range-transmission instruments were made by Siemans-Holske Co., and are of the synchronous motor type. These instruments are strong and well protected. Mechanical parts worked smoothly. As there was no electric power on the *Goeben*, through lack of coal, the system was not seen in full operation. The range-finder transmission instruments to turrets were for single-target or double-target firing. On the transmitter in the control station, corrections were put on for deflection due to wind, speed of ship, etc. Then a summary of these differences was made automatically and the deflection finally sent to the turret. This method seemed to be slow and crude. There were receivers from each range finder of the Sieman-Holske type, which showed range in meters. Then these receivers were automatically connected together, whereby their average could be obtained and automatically put into a range clock. At each receiver was a means for cutting out the reading in case it appeared to be very inaccurate. It thus appeared that the Germans adhered to their range finder in fire-control system. The transmitters and receivers, however, made by Sieman-Holske are most reliable and most accurate. An elaborate battle order visual for communicating from the turret to each top is used. This is also along the same lines as the Austrian ships.

Range Keeping Instruments.

The range finders keep the range, the gunnery officer applies a spotting correction to the range clock (no plotting board of any description was used), and the average of the range-finder reading plus the spot is automatically shown on the range clock. There was a clock in each control tower, said to look somewhat like a Vickers clock. Both of these clocks had been removed. Considering the space where it was located, vertically on the side of the tower, it would seem to be the same size as the Vickers clock. I was informed by the Turkish officers that this was a German design, although it looked like and operated like a Vickers clock. (As some of these Turkish officers had spent a year in England they were familiar with some of the British fire-control instruments.)

It was also stated that if ranges were obtained from range finders, that the gun range was equal to the average range finders' range plus the spot. The rate of change feature of the clock was not used, except when no ranges were obtained from range finders. When this method was employed the autodumeresque, similar to the British and placed over the gyro compass, was set to get the rate of change. Estimation of the enemy's course and change of speeds was made

by the spotter in the top and the gunnery officer. Then the rate of change of range was observed on the dumeresque and put on the clock. There appeared to be no method of keeping the rate of change of deflection. It is to be noted that all range-keeping instruments were in the control towers; that in the transmiting station below there was no "plotting room," it being used simply as its name implies.

Optical Instruments.

The optical instruments were all of the Zeiss and Goertz design. The periscopes in turrets were vertical variable power, 7 to 18 power. The range finders were all Zeiss instruments. Binoculars were of the Zeiss prismatic and Goertz.

Director Firing.

There was no director firing on the ship. It is true that the system for turrets and broadside follow the pointer in azimuth was installed and appeared to be very good. There was, however, no method for accurately laying the guns in elevation or firing them while the ship was rolling, unless the target could be seen from the turret. The Turkish officers were familiar with the Scott system, and did not seem to feel that there ever would be a time when the target could not be seen from the turret.

Control of Fire.

In the control of fire there was a spotter in each top, the first gunnery officer in the forward tower, the second gunnery officer in the after tower, the third control officer in No. 2 turret. Ordinarily the first gunnery officer forward controlled the fire of both turrets and broadside guns from his station. In case of two targets, the second gunnery officer in the after station controls the fire of turret and broadside guns on the second target. It appears to be possible with these two central control towers and plotting rooms combined to conduct a fairly accurate fire on two targets. In connection with night control it was possible after a target was seen from either the top or control station to immediately train all guns and searchlights to that target, and with all cut-out switches it appeared to be able to handle fire-control casualties very quickly. For example, in case the foremast, foretop, or control forward were out of commission, the former executive officer of the *Goeben* actually demonstrated himself how quickly the after stations could be thrown in and control taken up. By means of the switches being colored red and blue and the instructions in the transmitting station governing the doctrine of control, it is possible for action to be taken on the casualties without any further word or instructions.

From what was learned by observation and questions, it appears that no method of plotting, tracking, or any notable ingenious

gadget was used by the Germans on the *Goeben*. The only instrument of range-keeper type they had was the range clock, previously referred to; and the Turkish officers told me that the Germans had modeled it after the Vickers clock. It is also worthy of note that the date of the Siemans-Holske transmission follow-the-pointer system in train is 1916. These were put in on the *Goeben* in the early part of 1917, while at Constantinople. It therefore appears that after the Battle of Jutland the Germans learned that a follow-the-pointer system in train was necessary.

The spotting is done from aloft and also from the control station. Under clear conditions a ladder system combined with a halving method of spotting was used. Under misty conditions, as in Jutland, I was told that arbitrary spots were given as up to 4,000 down 4,000. The Germans on the *Goeben* in spotting did not attempt to estimate how far short or over the shots or salvos fell. There were no gadgets, tables, or special instruments used in training spotters on the *Goeben*.

Powder and Cartridge Cases.

No special remark can be made on the powder and cartridge cases observed. Both were well stowed in the magazine and arrangements for getting them out were excellent. The cartridge cases were protected by a small bracket with three legs, wooden base, which fitted over the base of the case and next to the primer. The charge of a 12-inch gun consisted of one cartridge case 4 feet long containing 95 kilos of powder and four small bags of powder weighing 25 kilos each. It is therefore seen that the powder charge of this type of gun was great, but that even with 15° of elevation a maximum range of only 18,000 yards was obtained. Use of bags and cartridge cases made the loading complicated, introduced some danger, and was not efficient as on Austrian Skods 30.5 c. m. guns, wherein the whole charge was in one cartridge case. The powder for the 15 c. m. gun was put up in one cartridge case. No special comment is necessary on this type. It was stated that no misfires ever occurred.

Torpedoes, Torpedo Tubes, and Torpedo Directors.

There are three torpedo rooms, one in the eyes of the ship and one on each side forward. Each room carries a single submerged tube. The bow tube opens to the sea, is level, and very simple in design. The beam tubes are set at an angle about 30° forward of the beam and are side opening. The tubes are very long and carry 9 meter by 50 c. m. torpedo. Firing was done electrically from the control tower, a dial showing when torpedo was ready for firing.

There are three directors (open-sight types) and one periscope director in each tower. One director was installed in the forward control tower, but its use was not understood by the Turkish officers.

In this connection, there was painted in the control tower a table which gave the bearing, the maximum range on, when torpedoes should be fired, and distance in yards the torpedo would run when fired on that bearing. It therefore appeared that the torpedo officer had in front of him constantly data by which he knew when it was best to fire torpedoes.

The Turkish officers on the *Goeben* put little confidence in their torpedoes as an offensive element on the ship, and no torpedoes were fired in any engagement. They said, however, that no difficulty had been experienced in launching torpedoes from submerged tubes at speed of 28 knots.

The officers on the *Goeben* did not think that she would be seriously injured by a torpedo hit. She was not struck by a torpedo during the war.

Armor and Projectiles.

On the side near where the mine explosion took place two armor plates appeared to be slightly loose. None of the turrets were struck during the war. One Russian high-explosive shell came through the side into No. 10 six-inch compartment, burst, but did no material damage to the bulkheads. Few fragments of the projectile were still to be seen in the after bulkhead of the gun room. The Russian high-explosive shells also hit and burst on the port side, near the base of the smoke pipe. This was repaired easily.

All projectiles on the *Goeben* were armor-piercing. Allowance for turrets, 99 per gun.

Magazines, Their Location, Systems of Flooding, Etc.

There are separate magazine units located directly below the turrets. Each magazine supplies the two guns of the turret. In one room of the magazine were stowed the cartridge cases, in fore-and-aft horizontal stowage. In the other magazine compartment were stowed powder bags and brass containers. Only a very small door exists between the two compartments. The big brass cases can be lifted up by purchasers and hauled along by an endless purchase, along a brass chute, through a manhole on top of the car, ready to go up in the car. Shells are stowed on the base and have springs, locks, and tongs. The magazines, in location, are isolated from the handling room and other parts of the turret. There are efficient means of flooding and draining, from centrifugal pumps and directly from the sea. The pipes are run directly overhead but are not perforated. Each magazine is connected directly with the bilge pumps for draining the magazine. They are evidently designed to give a maximum volume of water and no sprinkling. Flooding valves are operated from the valve-control stations. There was consid-

erable wood in the magazines, which was thought to introduce no particular danger. The Turkish officers stated that there never was any difficulty in maintaining an adequate supply of powder and shells for the guns.

The Turkish executive officer said that even when the guns were loading at 15-second intervals, and firing as rapidly as possible, that there was always shell and powder in the car, in the upper hoist, and ready for loading the guns; that the lower car was always filled and everything in readiness to load the lower car as soon as it came down. The ammunition hoists are of the two-stage type.

Control Stations.

The first gunnery officer's station was in the forward-control tower. In the after-control tower were battle order, range deflection indicators for broadside guns, range finder, stereoscopic type, periscope, gyro compass, torpedo director stand, Sieman-Holske follow the pointer and train, transmitter, Dumeresque, range finders' averaging instruments, German range clock. The personnel sat on stools or on the deck. Besides these instruments were voice tubes and whistle tubes to all turrets, broadside guns, searchlights, torpedo rooms, forward control station, and telephones, as previously stated. The personnel in the after-control tower were: Assistant gunnery officer; assistant torpedo officer on director; midshipman on Dumeresque, midshipman on clock; range-finder operator, target-bearing follow-the-pointer operator; periscope operators, two-men battle orders, turrets; two-men battle orders, broadside; one telephone operator. After-control tower was about 10 feet in diameter.

The first gunnery officer's station was in the forward control tower. Directly below this tower was a small pocket where was located the transmitting instruments for turrets and broadside guns. This made more room in the gunnery officer's station for his assistants and less confusion than in the after control tower. There were practically the same instruments forward as aft. The main difference being that forward no battle-order visuals were located directly near the gunnery officer. Orders to these visuals were sent by voice tube through the deck to the little room directly below the gunnery officer. Including the gunnery officer, the personnel at this station numbered 16 men. Range-finder operators were enlisted men, who had special training in using stereoscopic range finders.

The gunnery officer was in direct communication with the captain by a short length of voice tube to the conning tower. The auto-Dumeresque used by the *Goeben* was similar exactly to that in the British Navy. The target bearing instruments of the Sieman-Holske type, with its periscope, is similar in operation to these instruments in

other navies. It, however, is of the synchronous type, reliable and of good design and manufacture. The torpedo directors themselves had been removed and taken away. There was only an improvised open-sight type mounted in a slit of the control tower. This, of course, was used only in case the main director and its periscope were out of commission. The close proximity of instruments to the range finder made it possible for both to work together well, get the ranges started quickly on the same target and the turrets, searchlights and broadside guns get on the target. A good deal of importance on the *Goeben* was attached to the problem of divided fire. In view of her position in the war, usually overwhelmed by superior numbers, her organization and installation of material was such as to enable her to control for divided fire. During her run from Messina to Constantinople, when near the British light cruisers and also two British dreadnoughts, it would have been necessary for her to maintain a fire on two targets simultaneously. This also was the case in her engagements with the Black Sea Fleet.

Transmitting Station.

The transmitting station is located forward, abaft the control station. It is about 20 feet square, and contains a complete duplication of transmitting instruments, as was installed in the control towers. It also has fire-control and ship's telephone switchboard. There are also the cut-out switches and transfer switches that throw in the controllers depending on what station is controlling. It is connected by telephone and voice tubes to the main control station, turrets, and guns. This was solely used as a transmitting station; although it is believed that a range clock and Dumeresque were at some time located there. Its main purpose was to act as a transmitting station and distribution room of the fire-control system. Also in case both towers were out of commission, ranges could be still sent to the turrets by the transmitting station. The executive officer of the *Goeben* demonstrated each of the switches, and seemed to be perfectly familiar with handling all casualties which might come up. For example, what would happen if the forward station was gone, the after station gone, both stations gone, who would control, etc., and to all these questions he made an immediate reply, cutting out the particular circuit involved, showing clearly that he and the other officers, too, probably knew exactly what to do under all conditions to keep up the fire.

The painted instruction cards and graphic method of indicating the use of the switch control, were so clear that anyone after a little drill could readily understand their system. It was also evident that this system was of permanent nature and had been used a greater part of the war; and their system under fire control as in ship

casualties enabled them to find out when a station went out of commission and to take immediate action on it without further orders.

Engineering.

There are 24 Thornycroft boilers located in 12 fire rooms; 4 rooms fore and aft. There are 2 turbines whose combinations are unknown, 4 centrifugal pumps for flooding and draining compartments, 2 dynamo rooms, 6 turbine generators; there were 4 searchlights on each mast. They are trained and elevated from platforms on upperstructure. There were bearing transmitter repeaters near the searchlight controller, opeated by the tansmitters in the contol towers from the follow the pointer dial. The searchlight was kept on elevation by the controller operator. Both elevation and train were mechanical.

The ship burns coal, which, during the war, was hard to get in Turkey and was not of particularly good quality.

Construction.

The features of construction of the *Goeben*, especially as to water-tight integrity is one of the most interesting points of the vessel. There are five athwartship water-tight subdivisions. There are two outside water-tight compartments, which are designed as additional protection against torpedo and mine explosions. The inside bulkhead is about 1-inch plating reinforced by wide butt straps treble riveted and double channel-bar stiffeners about 24 inches apart.

All joints in stiffeneres are made of heavy double plates. Before any compartment of the ship of vital consequence is flooded, this inside bulkhead must be penetrated; and in the vicinity of the boiler rooms it is necessary to not only penetrate these water-tight compartments, but also the bunkers themselves. This design, therefore, makes a double skin instead of ordinary double bottoms. In the fire and engine room are two fore and aft bulkheads. In each of the 15 subdivisions on the bulkheads are printed the number of the valves, flood cocks directly below them. There are telephones near each station for transmitting orders to central station regarding compartment which is to be flooded or opened to suction pumps. At each of these stations are petty officers of the engineer's force who are off watch. Constantly they take soundings in all subdivisions of their compartments and make an immediate report whenever they find one flooded.

In case the central station for any reason is out of commission, there is a second so-called central station in a wing passage which can take up control of the ship's casualties and give orders regarding the pumping or flooding of the compartments. Not only the design of the ship, but the organization for keeping her afloat and on an even keel, was evidently considered by the Germans to rank with equal importance with their guns and torpedoes.

The water-tight doors are closed both by hydraulic power and by hand. The masts consist of two parts, are light, and have no tripod. The top is small and designed to hold two or three men only. The only instruments on the top is a target bearing follow the pointer transmitter (there is no range finder). The smoke pipes are armored. The ventilators and some pipes near the masts are protected by veins and shutters against splinters.

During the war no boats were carried at sea. Davits, unshipped; crane lowered to deck. Life rafts were carried on turrets on each deck. The officers' compartments were compact and comfortable. No woodwork. Steel corrugated to give a wood finish in cabins and wardrooms. Under skylight knife-edge there is a small trough fitted, preventing leaking of water on the tables in the wardrooms. The crew's quarters appear to be fairly comfortable and well ventilated. There was a coal galley and bake shop. Wash rooms were large and well laid out and were in good condition.

The central station, located directly below the conning tower, is fitted out with all necessary voice tubes, and telephone communications to the control stations, turrets, and to the 12 water-tight subdivisions of the ship. It is about 30 feet long by 15 feet wide. Immediately forward of the central station is a chart room about 15 feet square, where all the charts and important navigating instruments of the ship are kept. On the starboard side of the central station is a large chart desk and board for plotting; also a cabinet containing three chronometers. A separate tube from the chart house goes direct to the navigator and in the conning tower. Navigators and petty officers remain in the central station, keep all records of changes of course and speeds, and plot the position of the ship. With the exception of one chart, which may be possibly used in the conning tower, all others remain in the chart house all of the time. It is therefore unnecessary when a ship clears for action to change the location of charts, chronometers, or sextants. (During the inspection of the chart house, incidentally it was noted that there were still photographs of the Kaiser, Hindenburg, and other ranking German officers posted on the sides of the room. The petty officer in charge of this room looked and acted like a German, although he was supposed to be a Turkish sailor. He did not seem to care to show us the chart house and its contents.)

The most notable thing in the central station was the chart showing the location of all compartments of the ship used by the executive officer for keeping record of what compartments have been damaged, what compartments have been flooded, or should be flooded to bring the ship on an even keel, and the weights involved in each case. This drawing is about 6 feet long and represents a plan view of the ship at the water line, with all the compartments

below the water line and bilges outward and outboard. At a first glance it gives the ship the appearance of having a great beam; but the reason for this is that all the under compartments on the different decks are shown instead of being indicated in dotted lines. This diagram is therefore, in width, not exactly to scale; but this type of projection enables one to see at a glance each compartment, to find out how much water it holds in tons, and see its relation to the compartment forward and on the other side of the ship. In each of these compartments is a small hole with a peg to indicate damaged or being flooded. The different compartments are shown in different colors and stand out very clear. The executive officer has this big diagram placed in front of him on a table. His assistant keeps in communication with the 15 petty officers who are in charge of each of the 12 water-tight subdivisions of the ship. Whenever one of these petty officers finds a compartment has been damaged, he reports to the executive officer by telephone or voice tube, whether it is partially or fully flooded, mentions the compartment, and what caused it. The executive officer then looks at his diagram, sees the amount of list on the ship and gives such orders to flood compartment or compartments as will counterbalance this weight and bring the ship on an even keel. After the compartment is flooded he puts a peg over that compartment and shows by red pencil that compartment is full of water and out of commission. I was told in the case of the two mine explosions in the Dardanelles that in the central station they hardly knew what happened. Two minutes after the mine exploded on the port side, which penetrated both water-tight subdivisions and bunker outside the boiler room, a report had been made to the central station and orders given to flood certain compartments on the starboard side. The executive officer said that he had become so accustomed to handling mine explosions that he did not think anything of them. He said that using this board was like playing a game of chess.

Another diagram about 6 feet long showed all the compartments and subdivisions with the flooding and draining arrangements indicated in colors. It is therefore possible for the executive officer to see what lines are used for flooding and draining on fire main; are still in commission and give definite orders as to how a compartment may be flooded, drained, or how action can be taken in case of fire. According to the organization, he is held entirely responsible for everything pertaining to the water-tight integrity of the ship, keeping her afloat, on an even keel, and acting on casualties the ship received in action. Considering that the *Goeben* in the Black Sea engagements was hit by three mines, and that later in her sortie off the Dardanelles she struck three mines, it appears that the execu-

tive officer of the *Goeben* is chiefly responsible for her being afloat to-day.

In the inspection of the ship with him, a great impression was made as to how thoroughly he knew every detail of his ship, her fittings, and action that should be taken to handle various casualties.

For ship control the captain's station was always in the conning tower night and day; the admiral was also with him. All the signal parties were behind armor. The flag hoists were made through chutes in the deck above. The location of signal station behind armor also kept the party free from noise and blast of the turrets.

The sick bay and dressing station was down below deck, behind armor. As soon as report was made to the central station, the dressing station was notified and a party sent to handle the dead and wounded. All the dead during an action were laid out below, examined, identified, and buried at sea. The wounded are attended to during action.

Organization.

The crew of the *Goeben* during the war numbered 1,300 men and 40 officers. Half of these were said to be Germans and the other half Turks. The captain of the ship was of the Regular German Navy, Capt. Ackerman. The executive officer of the ship was a Turk, and he had a German officer under him as an assistant. The first gunnery officer was a German naval officer, who had come from one of the battleships of the High Sea Fleet. The second gunnery officer was also a German. On deck and in engine room they stood watch and watch, and when in the vicinity of the enemy or cruising at night all officers and men slept in their battle stations. For example, at night underway, when in the Black Sea or near the enemy, the executive officer slept on a cot in the central station. During the day food was cooked and sent direct to the turrets and all stations to the men on watch. The chief engineer of the ship was a Turkish officer who had spent some time in England. He had four assistant engineers. There were 22 men in each turret's crew, and 10 men to each broadside gun, 6-inch type. In the central station were the executive officer, navigator, quartermaster, voice-tube and telephone men.

At each station, in each turret, and at each gun were hung cards of substantial material, and upon these was painted in large letters the organization of the crew, their duties, and the different actions which should be taken for different cases. These instructions were thorough and appeared to have been there for some time. Even though the ship is now interned and there are few officers and men on board, it is clearly possible to put the war complement on, assign

them to stations, and have them perform their duties at each station very quickly. A great deal of this is due to the clear method of telling each man at each station what to do and how to do it.

In the system of drills and training a point that stood out foremost was that all officers and men knew their ship. As soon as an officer or man joined the ship, his first duty was to learn how it was built, and all its different compartments, their numbers, what was in these compartments, who had charge of the compartments, and how the water-tight compartments could be flooded or drained. This part of the training was apparently given precedence over everything else on the ship. The organization of the *Goeben*, from what I learned from the Turkish officers who were with the High Seas Fleet, was such as to consider the first thing of all, with equal rank with her offensive power, to be how to keep afloat. So after being shown around the ship and seeing each compartment, including the turret, central stations, and all, practical instruction began at a model. This model is one of the most interesting and valuable things seen on the *Goeben*. Considering that the *Goeben* is one of the few, if not the only ship, which has survived six mine explosions, it is a matter of intense interest to study why she is afloat to-day. The answer appears to be, first, her design; and, second, her organization for keeping afloat. The model study and its use is entitled to a big share of the credit, along with the executive officer.

The model is about 15 feet long, made of tin, and built to scale. The outer skin is removed so that from the side all the outboard compartments on each deck can be seen. Similarly, from the plan, it is possible to look down on the decks and see the compartments on the upper deck. In each compartment there are small pipes, which indicate how it may be flooded or drained. The flooding pipe is painted green and the drainage pipe painted red. These pipes lead up from a compartment to a spot where the valve is for opening them. The model ship itself is built up from the keel in sections, so that each section on deck can be removed like a tray. Hence, starting in from the upper deck it is possible to take out a section of the ship, which, for example, is the wardroom, and then look down on the compartment located below the wardroom and see what they are, how pipes are in them, and what relation they bear to other compartments. It is further possible to remove the sections on each water-tight subdivision of each of the 15 water-tight subdivisions on the ship. The officer or man then who is new to the ship, besides the elaborate ship's blue prints or diagram carried in the ship's files or in his room, is kept busy looking around the ship, studying the model and learning his ship until he had demonstrated to the executive officer or other officer detailed that he knows exactly every compartment of the ship, what it is for, how

it is protected, how to find out whether it is damaged, how to repair the damage, how to flood or drain it, and be able to do it intelligently. This applies equally to the fireman, reporting on fires, leading the hose, cutting out of risers, etc. In addition to all of this, the man is expected to know and know quite thoroughly what material and instruments there are at different stations, who operates them; read from the instructions at these stations and have a general idea of what is going on in each part of the ship at the different drills or exercises when at anchor or when underway. Judging from the knowledge displayed by the executive officer and some of the other officers who came with us on this inspection—even including the chief engineer—it is evident that this system of instruction was not only well planned out, but it was very well carried out. Considering everything on the *Goeben*, and observations made elsewhere, it is believed that everything which can be done to insure keeping the ship afloat, either by design, organization, drill, or selection of personnel to perform this highly responsible duty, was carried out. It is the greatest lesson learned.

Miscellaneous Notes.

It is stated that a single mine explosion, as a rule, flooded only the outer water-tight subdivision, and if two water-tight subdivisions were flooded together in the same compartment it was believed it was caused by the explosion of two or three mines at the same time. In the Black Sea it was said that there were three holes in the ship from three distinct mine explosions. The ship after this could run at a speed of 20 knots and returned to Constantinople. These holes were repaired by using caissons. This made the work slow, but as no dock was available it was the only way. In the Dardanelles sortie the ship struck three mines. The holes in her sides still remain. There has been no opportunity to make repairs, but she lies afloat almost apparently in good condition, and is said to be able to still make 20 knots. An inspection was made below on the port side in the dynamo room. Here a bulkhead was carefully noted for any structural weakness. This bulkhead was the inner bulkhead of the two water-tight subdivisions. Outside was 300 tons of water. There was no buckling; only a very slight leak and rust; in fact, nothing abnormal. The dynamo room was absolutely dry.

In order to inspect the damage done by another mine explosion, visited the port outboard boiler room. Here the inner bulkhead next to the bunker was shored up. The boiler room, however, was dry. Bunker door was jammed and secured hard down. The bulkhead in one place had started to bulge, but a heavy butt strap and small distance between frames had apparently prevented it from bulging seriously, practically no water leaking around rivets. Except for the heavy shoring it is probable that nothing abnormal

would be noticed. Outside of this bulkhead, two water-tight subdivisions and bunker were open to the sea. The executive officer said that the ship had hit something, but did not know what it was. Inside of two minutes the sounding party had reported what had happened, and he had flooded certain other compartments on the other side, although about this time another mine explosion occurred on the starboard side, which helped him in bringing his ship on an even keel. By studying his plan and seeing the weights of water involved he was able to decide how much water he would have to flood in on the starboard side to make it even up the big hole in the port side, allowing for the amount of water that had already come in due to the second mine explosion. Considering this mine explosion outside the boiler room, the executive officer stated that he did not think that the ship would sink even if the boiler room itself was flooded.

NEW EXPLOSIVE.

Source: Reliable.

6 November, 1918.

(10981.)

Nelit is owned and patented by a company Tillit, and the company Sprangamnen have bought the right to manufacture and sell it in Sweden. The demonstration was made on the site of the new factory, which is being built 2½ kilometers from a small station on the railway between Stockholm and Upsala. At present Nelit is made at their laboratory in Stockholm.

It is at present made in the form of a powder inclosed in cartridges made of paraffined paper. Some of the tests were made in comparison with another Swedish explosive Carlsonite.

Test No. 1.—A package of 10 cartons of Nelit was fired into with an army rifle, four or five bullets penetrating nearly all cartridges, without the Nelit exploding. A package of Carlsonite was then fired into, with the result that it exploded with the first shot.

Test No. 2.—Two cartridges were placed about 8 inches apart on a wooden box. One was exploded by means of a time fuse, while the other remained intact. To show this was not a dummy, it was also exploded by means of fuse and cap. The same test was then made with Carlsonite, which resulted in the cartridge without the fuse exploding from detonation.

Test No. 3.—A torch was applied to the Nelit without it catching fire, while the Carlsonite burned like a calcium light; two cartridges of Nelit were placed among the burning Carlsonite, but were only charred from the effects of it. They were then exploded with fuse and caps, showing that the heat had had no effect on its explosive power.

Then several demonstrations were made. Blowing up a large fir tree with its roots, cutting off the trunk of another by placing the explosive in holes bored in the tree, and blowing up part of a granite hill. All these experiments were made with half the quantity that would have been required if dynamite had been used.

They also showed how a charge of 80 grams cut a rail of good size and made of Bessemer steel.

The inventor of Nelit is Dr. Tissell, and following advantages are claimed by him:

(1) Insensible to heat (proven by test 3).
(2) Insensible to cold.
(3) Detonation only with cap and fuse.
(4) Will bear compression with perfect safety.
(5) Can be transported with perfect safety. (Swedish Government will allow it to be transported without restriction.)

AVIATION.

FLEET AIR DETACHMENT.

Source: Reliable.

11 August, 1919.

Early in January, 1919, a detachment of six H–16 flying boats was sent to Guantanamo Bay, Cuba, to operate with the United States fleet, for the purpose of demonstrating the use of aircraft in actual naval operations. It was decided to operate these flying boats from moorings and to quarter the aviation personnel on a ship carrying necessary repair personnel, necessary spare material, etc., for the upkeep of the squadron.

The U. S. S. *Shawmut* was detailed for a period of six months for this duty. Capt. G. W. Steele, jr., United States Navy, was designated as the commander air detachment in command of the *Shawmut*, and Lieut. Commander B. G. Leighton, United States Navy, was assigned as squadron commander.

In addition to the six flying boats there was also an airplane division consisting of two Sopwith camels and one 1½ strutter on board the U. S. S. *Texas* under the command of Lieut. Commander E. O. McDonnell, United States Navy.

There was also a kite balloon division of six kite balloons to be distributed to various ships of the fleet as required. Each ship carrying a kite balloon also carried one kite balloon pilot. The kite balloon maintenance division, for the purpose of inflation and repairing kite balloons as necessary, was also carried on board the *Shawmut* under the direction of Lieut. (J. G.) J. G. Paul, U. S. N. R. F.

Formal assignment of the U. S. S. *Shawmut* to this duty was made on January 27. On February 4, the commander air detachment assumed command of this vessel at Boston Navy Yard. The mine gear on board the *Shawmut* was not removed, but guns and gun platform on after deck were removed. Quarters for additional officers and sleeping accommodations for repair and seaplane crews were installed. Work benches were installed on the mine deck; a portable hydrogen generator, two hydrogen compressors with piping, manifolds, connections, etc., were installed on the spar deck aft. This work was completed on February 8.

The *Shawmut* proceeded to Hampton Roads, took on board all aviation personnel and material, and on the morning of 11 February, 1919, sailed for Guantanamo, Cuba, arriving at Guantanamo 14 February, 1919.

On 6 February three H–16 flying boats left Pensacola for Miami under the command of Lieut. (J. G.) J. H. Hawkins, U. S. N. R. F.; all machines arrived at Miami about dusk on 7 February, having stopped at Tampa to refuel. On 6 February three H–16's under the command of Lieut. Commander B. G. Leighton left Hampton Roads and arrived at Miami on the afternoon of 8 February, having stopped at Morehead City, N. C., and Brunswick, Ga., for fuel.

In accordance with instructions from commander, Air Detachment, all six planes left Miami on 13 February. They arrived at Port Sagua La Grande the same day, refueled, and proceeded to Nuevitas the following day, where they again refueled. One flying boat made a forced landing between Sagua La Grande and Nuevitas with a broken cam shaft, taxied in, and anchored at Paredon Grande Key. Before assistance could be sent a heavy wind came up from the northwest and carried away the anchor line. The machine was driven on the beach and damaged beyond repair. On Saturday, 15 February, the remaining five flying boats proceeded to Guantanamo Bay, Cuba, arriving there in the afternoon. The flying boats were moored in the vicinity of the *Shawmut*, and the division was reported ready for duty. In the meanwhile the airplane division had located a field near Conde Bluff well suited for landing and had transferred planes and personnel from the *Texas* to this field. A balloon park was located on Fisherman's Point for balloons. By the night of 15 February, the date the flying boats arrived at Guantanamo and the day following arrival of the *Shawmut* at Guantanamo, the entire Air Detachment had been assembled and was ready for duty. Flying boats from Hampton Roads had completed 1,500 miles in 32 hours, and those from Pensacola had completed the 1,200 miles in 26 hours. It is noteworthy that five of the six planes which started for Guantanamo arrived there on schedule time and that all five of the planes on arrival were ready for duty. After refueling on the following day, all five machines were actually flying on active duty with the fleet for an average of more than four hours per plane.

In accordance with orders received from commander in chief on the afternoon of 15 February, the inflation of three kite balloons was commenced. Great difficulty was experienced with the hydrogen generator, which was found to be in an unsatisfactory working condition. Inflation was continued from hydrogen flasks which had been filled before leaving the United States. Repairs to the generator and work on inflation continued day and night on board the *Shawmut*, and on 17 February three kite balloons were delivered

to the battleships as directed. This inflation was conducted under most difficult conditions. The quarter deck of the *Shawmut* was not sufficiently large to take the balloons without overhanging the stern. The piping had been hastily installed at the Boston Navy Yard, and many leaks developed.

The crew was inexperienced at inflating under these conditions. It was due only to the untiring efforts of Lieut. (J. G.) J. G. Paul and Lieut. (J. G.) C. D. Pardee and the entire generator crew, who worked for two nights and a day without rest, that the inflation was accomplished on schedule time.

On 17 February all five flying boats of the Seaplane Squadron, two airplanes from the Airplane Squadron, and three kite balloons participated in long-range spotting practice. With two exceptions, none of the pilots had ever observed heavy gun fire before. In spite of this fact, more than 90 per cent of the pilots sent in a better score than that of the best ship's spotter in the fleet. The average spotting error of all aircraft spotters was less than the spotting error of the best ship's spotter and much less than the dispersion of the average salvo.

On 19 February, while cruising outside Guantanamo Bay, wind about 40 knots, *H–16* (*No. 833*), Ensign D. Wilson, first pilot, and Ensign J. L. Murphy, second pilot, was forced to land down wind. A heavy surf was breaking against coral reefs, and the machine drifted in upon them and sank. The crew, after a great deal of difficulty, gained the shore and climbed up the cliff, sustaining severe lacerations and bruises as a result of being thrown upon the reefs by the heavy sea.

From then on flights were made nearly every day by boats of the Seaplane Squadron; some flights of particular interest are given below as indicative of the type of work that was accomplished.

On 24 February four planes exercised with the fleet during tactical exercises, maintaining radio communication, reporting positions of the fleet, and making bomb attacks with dummy bombs. One Camel airplane exercised at attacking flying-boat squadron on this day.

On 25 February three planes took off on a search problem, attempting to locate the battleship fleet, which was reported as bearing between south and southwest of Guantanamo Bay. In taking off, one of the planes struck a piece of driftwood and tore a hole in her bottom. This plane kept the air until a temporary stopper had been made, then landed on the beach, was pulled off, and placed on seaplane barge. A new bottom was practically built by the repair crew. The remaining two seaplanes proceeded to sea, carrying out sweep search, and after about an hour and a half located the fleet and made reports at 10-minute intervals by radio to the base commander, giving position, course, speed, formation, etc., for a period of more

than two hours. Later the checking of these positions showed that all positions reported had been accurate within 5 miles.

On 28 February a similar search flight was made, this time in conjunction with the Submarine Division. The enemy fleet was reported as bearing between southeast and southwest of Guantanamo Bay. The submarine force was under orders to proceed to sea, locate the fleet, and deliver a submarine attack. The Seaplane Squadron was given orders to locate the fleet, keep in constant touch, communicate with the Submarine Division, and aid the latter in locating the fleet and in delivering the attack. The fleet was located 60 miles south of Guantanamo Bay, reports of position, courses, and speed were sent at frequent intervals to the Submarine Division. Later these reports proved to be accurate within 5 miles. With the information thus received the subs were able, by changing course and steaming at full speed, to make contact and attack the fleet. This attack was delivered more than 70 miles from the base at Guantanamo Bay. The entire exercises required about five hours.

On 3 March motor trouble having developed in one plane, it was decided to change the engines; this was done afloat. The flying boat was hauled up on a seaplane barge, staging was rigged around the engine, the barge was brought alongside the *Shawmut*, the old engine was hauled out on the staging by using the ship's crane, and the old engines were replaced by new ones. The interval from the time the seaplane barge came alongside the *Shawmut* and the completion of the installation of the new engines in the engine beds was less than three hours. Subsequent to this, engines were changed in three other planes successfully and with little difficulty.

On 9 March, Sunday, Lieut. Commander E. O. McDonnell, United States Navy, made the first flight from a turret of an American battleship when, using a Sopwith Camel, he successfully took off from No. 2 turret of the U. S. S. *Texas*.

On 11 March seaplane *834* arrived from Pensacola, having been sent from Pensacola to replace seaplane *833*. This plane when it arrived was in very poor condition; a number of ribs in the wings and tail stabilizer were broken, and considerable difficulty was found with the engines. This plane was not put into efficient flying condition until just before the completion of operations at Guantanamo, and therefore did not figure in any of the operations.

On 17 March, during the fleet war games, three flying boats were employed on search problems with orders to locate, track, and report movements of the fleet. This exercise lasted for more than five hours. On the following day, 18 March, four flying boats engaged in similar work with orders to locate, track, and report the fleet, and then to shift base to Port au Prince, Haiti. The fleet was successfully lo-

cated off the western end of Haiti in three hours and a half, necessary reports were sent by radio, and the four flying boats proceeded to Port au Prince.

No. 834, the fifth flying boat of the division, was left at Guantanamo Bay. The *Shawmut* arrived at Port au Prince on the evening of the same day. The *Shawmut*, together with the flying squadron, remained at Port au Prince for liberty until Friday, 21 March. All four planes and the *Shawmut* got under way and proceeded without incident to Kingston, Jamaica, making the passage in 3 hours and 40 minutes. The air detachment remained at Kingston, Jamaica, for three days, giving liberty and recreation to the crews, and on the morning of 25 March the four machines took off at 9.30 for Guantanamo, arriving there about 2 p. m.

On 28 March live bombing practice was attempted at target towed by the *Shawmut*. Mark IV bombs were used, and the usual failures to function occurred. Only two out of the eight bombs dropped exploded.

On 29 March four flying boats of the air detachment went to sea, with orders to locate the fleet which was returning from a cruise to Trinidad. They sighted the fleet about 30 miles offshore and reported to the *Shawmut*, which ship steamed to intercept the battleships. The *Shawmut* upon arrival took position between the *Pennsylvania* and the *Delaware*, and put over towing target, steaming at 15 knots. Each of the four machines dropped live bombs from 2,000 feet. All bombing was done cross wind and cross wake of the target. Although only one bomb exploded, results obtained were excellent.

From 1 April to 4 April, inclusive, flying boats participated in long-range day individual practice for battleship fleet, doing control spotting for all firing. Communications were excellent, and in at least one case spots from aircraft were received in the plotting room ahead of the ship's spotter. This practice demonstrated beyond a doubt the great advantage to be gained in spotting from aircraft for heavy-gun fire.

On 5th and 6th of April all five machines, including No. 834, were tuned up, refueled, and put into condition for the return flight to the United States.

On 7 April all five machines proceeded without incident to Nuevitas, Cuba, leaving Guantanamo at 8 and arriving at Nuevitas at 11.40. Planes were refueled from the U. S. S. *Jouett* and *Patterson* and were ready to proceed three hours after arrival at Nuevitas.

On 8 April all five planes took off at 7.40 and proceeded along the northern coast of Cuba to Port Sagua la Grande, thence to Key West, Fla., arriving there without incident about noon. Owing to the fact that the fabric of these planes had deteriorated, it was

decided to leave them at Key West. The *Shawmut* arrived at Key West, and the following day all aviation personnel of the Air Detachment was taken on board the *Shawmut* and proceeded to Hampton Roads, Va., arriving there 13 April.

Following is a summary of operations of the Fleet Air Detachment during the expedition from Pensacola and Hampton Roads to Guantanamo and return to Key West:

(*a*) Flying time on various duties:

	Hours.	Min.
1. Travel flights	284	20
2. Spotting	63	11
3. Formation exercises	6	
4. Bombing and communication exercises	34	50
5. Reconnaissance, search	32	36
6. Observation	20	25
7. Test flights	14	42
(*b*) Total flying time	456	04
(*c*) Average of detachment per day (basis 52 flying days)	8	46
(*d*) Average of each plane per day (basis 52 flying days and 6 flying boats)	1	28
(*e*) Distance covered by squadron as a whole—miles (k)	7,127	
(*f*) Total machine miles—miles (k)	25,349	
(*g*) Forced landings, casualties, etc		11
1. Due to radiators	6	
2. Due to motors	5	
Plane casualties caused by motor trouble		2

One plane sent from Pensacola as replacement was sunk in Port Gibara on 10 March, when bottom was broken in on attempting to take off. This is not included in the above summary as this plane had not been delivered to the Air Detachment, and was proceeding independently of the Air Detachment.

Arriving at Hampton Roads, the *Shawmut* was temporarily detached from duty with the Air Detachment and was sent to Lisbon in connection with the trans-Atlantic flight. On the 1st of May, all the Air Detachment personnel was detached from the *Shawmut*, and ordered to the Air Station at Hampton Roads. Six new F–5–L flying boats were assembled at the Naval Aircraft Factory at Philadelphia with delivery to Hampton Roads by air route, also three N–9 seaplanes and one M. F. boat. Operations were conducted from Hampton Roads Air Station during the stay of the fleet in Hampton Roads. Little was accomplished in connection with the fleet during the period from 1 May until 12 June. During this time the Air Detachment, based on Hampton Roads, made occasional tests, and practice and formation flights in and about the Chesapeake Bay.

On 19 May, the F–5–L's and two N–9's of the Air Detachment, participated in long-range spotting practice with the United States fleet off the Virginia Capes, with excellent results.

On 6 June, all six F–5–L airboats went to Annapolis with the United States fleet, and remained there during June week exercises, returning to Hampton Roads 10 June.

On 12–13 June, all F–5–L's spotted for division practice off the Virginia Capes. On 13 June the *Shawmut* returned to Hampton Roads from Lisbon, and on 17 June the entire Air Detachment went on board the *Shawmut*. The *Shawmut*, with the Airboat Squadron, proceeded to Solomons Island for about 10 days shakedown. Considerable flying was done in N–9's during the entire period from the 1st of May. Capt. Steele was given instructions and made almost daily flights alone preliminary to qualifying for aviation on designation; mail trips were made daily between Hampton Roads and Solomons Island and general exercises, practices, etc., were carried out.

On 25 June the *Shawmut* proceeded to Cape May, N. J., en route to New York. All airboats (except *F–5–L 3615*, which damaged an aileron the previous night, and *3612*, which was left at Hampton Roads as an escort for *3615*) proceeded with the *Shawmut*.

On the following day, 27 June, the Air Detachment having been ordered to report at Rockaway Beach not later than 8 a. m. for duty in connection with meeting the U. S. S. *Zeppelin* returning with trans-Atlantic flight party, four machines, 3675, 3598, 3613, and 3676, left Cape May at 0500. Shortly after leaving Cape May, a low-lying mist settled in with strong south winds between 35 and 40 knots. Atlantic City was seen through the clouds. The clouds grew thicker and planes kept above them. Nothing further was seen until it was believed the planes were about opposite New York, when all machines descended through the clouds, finally sighting the water at about 400 feet (visibility very poor, air very rough, wind blowing about 45 knots), then proceeded for Rockaway. As the machines approached Long Island they were forced to descend to less than 100 feet. Flying at very low altitude the houses along the beach were barely visible from the machines. One machine missed a hotel by zooming over it. Other machines after circling about finally located their position, and landed at Rockaway. Finally all machines arrived for duty without mishap. About noon four machines took off in a blinding rain, went out to meet the *Zeppelin*, escorted her into the Narrows, and anchored in Gravesend Bay.

AVIATION SITUATION—ENGLAND.

Source: Reliable. **24 January, 1919.**

(8534.)

The reaction from the strain of war, the recent elections, the peace conference, demobilization, and other factors have as a whole produced an unsettled state of affairs in England. This causes a great deal of uncertainty as regards military affairs.

Concerning aviation, England at present is superior to any allied or enemy country. She has a great army of pilots, ground officers, and mechanics; a great air fleet, which includes not only good fighting machines and large bombing planes, the latter being fitted for long-distance passenger, mail, and general commercial flying.

The general public is proud of the work done by its air force during the war and appreciates the need for rapid communication between London and the colonies.

As an immense amount of capital is invested in many airplane manufacturing concerns, great efforts will be made by them to maintain the airplane industry.

Policy.

No definite policy, beyond the appointment of Mr. Winston Churchill as War Minister and Minister for the Air in one, has been announced by the Government. Mr. Churchill's appointment has not been wholly satisfactory to the people at large owing partly to the fact that he is considered an erratic, though sometimes brilliant, man, and partly to the fear that as dual Minister for War and Air, the Air will inevitably suffer. The following article by Lord Sydenham in the Sunday Times of 19 January, 1919, states very well these feelings of dissatisfaction:

> The question of the peace-time strength of the air ministry has not yet been announced and there is some doubt as to the actual organization and administrative powers which will be accorded to the present air ministry. Some newspapers and a good many officers in the R. A. F. take advanced opinions that the aviation service will be divided as follows:
>
> (1) *Military aviation* will be controlled by the air ministry, reorganized with a smaller personnel and a more efficient system.
>
> (2) *Naval aviation* will be placed once more under the Admiralty in so far as developing certain types of machines and training of personnel are concerned.
>
> (3) *Commercial aviation* will be placed under the ministry of transport (Sir Eric Geddes).

If such is the case, there will undoubtedly be a general supervising board or committee to regulate questions of supplies, etc. Undoubtedly the military and naval forces will have combined laboratories and research and experimental staffs. This is conjecture, as all that

is known at present is Mr. Churchill's appointment, with the subsequent appointment of Lord Londonderry as representative of the air ministry in the House of Lords. As noted, neither the peace-time strength of the air forces nor the lines along which they are to be developed have been announced. The question of armament at the peace conference will undoubtedly have a great deal to do with this question, and there is a strong feeling that an international conference should be held to discuss the air, both from a military and commercial point of view.

Commercial aviation, which has been discussed so freely in the newspapers lately, has not been discussed by any responsible member of the Government. Gen. Sykes, R. A. F., in his speech of distance flying—and material like this has been seized on quickly by newspapers so that to-day the popular feeling is that within a few months there will be a large commercial fleet whose activities will be not only mail-carrying and short passenger flights around the United Kingdom but long transcontinental trips from London to Cape Town or from London to Cairo, and thence to India. Whether all these newspaper discussions may be attributed to (1) the fact that they appeal to popular imagination and are therefore exploited by the newspapers, or (2) to the fact that large manufactures like Handley-Page, Sopwith, etc., are afraid of losing heavily as soon as war contracts cease, or (3) the fact that the Government may feel it necessary to maintain public enthusiasm is uncertain. Whatever the motives, the immense public interest is a fact. Particular prominence is given to the development of commercial flying in America, and the mail routes already established are looked upon with envy.

Military.

Although no future program has been drawn up for the R. A. F., very definite plans are being laid by such departments as can look ahead, such as the Directorate of Training, under Gen. Hierson. The lack of system in administrative and training depot stations has been a constant irritation during the war, and a program is now in process of writing which shall call for a four years' course of training for young Army and Navy fliers, which, of course, presupposes the establishment of an air college, which will rank with Sandhurst and Osborne, as a national institution.

The question of how much of an interest in or control over commercial flying the Air Ministry is to take is eagerly discussed, and there is no doubt that the Air Ministry will attempt to have at least supervising authority over private enterprises. Public opinion is against such a move as being likely to cripple individual enterprises. Government interference is never looked on with favor. However, the air force is certainly going to do the pioneer work in laying out

long routes to India, Cape Town, and Australia. Already the Indian trip has been made successfully and the other day a Handley-Page went to Khartum. There are R. A. F. officers in Africa, India, Siam, Burma, and Australia, who are laying out aerodromes and landing fields as fast as possible.

Organization of the Air Ministry.

Dissatisfaction with the present Air Ministry is reflected in Lord Sydenham's article:

That serious defects existed in the Air Ministry has been widely felt by the fighting men, but public criticism has been averted by three fortunate circumstances:

1. The gallantry, devotion, and daring of the fighting elements of the R. A. F. have been beyond all praise. Their action in every theater of war has been supremely important, and the decisive victory of the Allies on the western front is largely due to their splendid efforts.

2. The manufacturers of aircraft and engines—some of them new to the work—have shown remarkable capacity alike in organizing speed of production and in securing high quality of workmanship.

3. Admirable research work has been accomplished which, combined with other scientific investigations, has enabled the design of aircraft to make wonderful progress, and to keep pace with the exacting needs of the war. On the other hand, owing to defective administration, the experience of the fighting airman has not always received adequate consideration, with results that might have been serious.

He does not particularize just what the faults of the Air Ministry are, but from personal observation I should say that it lacks efficient organization. At present there is a staff of over 3,000 officers in the Air Ministry, which has led to duplication, and, as Lord Rothermore points out, "A swollen organization always means inefficient administration." There is much duplication and many of these most "excellent officers" are engaged in filling up unnecessary forms and "carrying out circumlocutory methods of conducting business."

Whatever Lord Sydenham may have to say on the defects of the Air Ministry, with its huge staff and "circumlocutory" methods, it has maintained its work with a high degree of efficiency. It has done this in spite rather than because of its size and importance.

Certain departments, like the research and experimental, are highly organized and efficient, while others, mostly administrative, dealing with communications, planning, etc., have made serious mistakes. Although the British had better designers and better materials than the Germans, the Germans produced the "Fokker," which, while a clumsy machine, was admirably suited to fighting purposes, long before the British at home had realized just what kind of machine was needed at the front. It is impossible at present to say what will become of the Air Ministry, or what strength of personnel will be maintained.

The Admiralty.

The Admiralty Board, ever since it lost the Royal Naval Air Service, has wished to regain it. There is at present a definite movement to accomplish this. The arguments of the Admiralty are based on the following:

(1) That the constantly increasing air activities in connection with the fleet points to the fact that this will continue to grow, and that the field of work over the sea, for military reasons, has not been sufficiently exploited during this war.

(2) That the types of machines will be different, as the necessities of the two services differ widely.

(3) That an officer who has to work with the Navy needs special naval training, and, in fact, should be able to command a ship, as well as an aeroplane.

(4) That if only one air college is established officers will not be sufficiently familiar with the doings of the fleet if they are chosen for that duty.

(5) That if the Air Ministry continues to be preponderately military in nature the interests of the fleet, "Britain's sure shield," will not be protected, whereas in peace time the work of the fleet is far more important than that of the land force.

(6) A further point in favor of a strong naval influence in aviation forces is indicated by Lord Sydenham:

> For a service which fights in navigated craft, naval methods and naval characteristics should have been the basis. The Royal Flying Corps swallowed the Royal Naval Air Service. The old flying titles were abandoned in favor of meaningless and superfluous and military substitutes, and where a single naval officer had managed a flying center with conspicuous success, three or four of the new military officials were employed, while cumbrous methods of procedure became general.

Commercial Flying.

In spite of the enormous newspaper interest and the significant speech of Gen. Sykes, quoted below, it is not believed by commercial fliers that much success can be hoped for either with mail or passenger carrying service here owing to weather conditions. Possibly when directional wireless is perfected there will be a greater chance. America, with its clear atmosphere, is a far more promising field. Commercial men connected with flying or interested in it are skeptical of the possibility of establishing even a regular passenger or mail carrying service between London and Edinburgh. There is fog almost invariably in the North of England when it is clear in the south and vice versa. Even passenger service between London and Paris is not granted much hope of success. The long routes between England and India or England and Cape Town are looked on as more possible, but as these will undoubtedly

be maintained, at least for a time, by the resources of the R. A. F., they can not be considered under the head of commercial flying. Several large steamship firms have, however, begun definite plans for establishing air routes in various parts of the world, and are preparing to put large amounts of money into their schemes. As soon as any reliable data can be obtained as to their plans a report will be forwarded.

Another item which discourages commercial fliers is the fact that there is no reliable data as to the expenses of aerodromes or upkeep of aeroplanes. During the war money was no object, and although the Government may be expected to issue data on the expense, it is felt that individual firms will have to draw their conclusions by experience only. It is significant that many manufacturers are now seeking to establish other sources of income. Sopwith, for instance, is turning over a large part of his plant to turning out cheap motor cycles with A. B. C. engines.

Gen. Sykes's speech of 8 January is typical of the kind of thing now being discussed:

Both for short-distance flights across country and for long journeys, such as those from England to India and Cairo to the Cape, the chief of the air staff believes, the aeroplane will very shortly be of commercial use. He indicated the establishment of a 6,000-mile aeroplane route to India in stages of 350 miles, for which 25 aerodromes, some of which are already in existence, will be needed.

The Royal Air Force, he further disclosed, are at present preparing the way for an aeroplane and a flying-boat route from Cairo to the Cape.

The safety of travel by aeroplane is now not much less than that of the older means of transport. Private flying may be resumed shortly after the opening of Parliament and the passing of the interim air regulations. * * *

Draft legislation for the governance of civil flying was being pushed on with all speed, but the work and difficulties involved were very great, and it was most important that even at the expense of a little delay a really sound position should be arrived at. It had been found that this private and domestic legislation depended for its character on the findings of the international conference. * * *

Although it was in connection with long-distance work that aviation had most to offer, it was well not to overlook the possibilities of such routes as London to Dublin and London to Glasgow. Study was now being given by the air ministry to those in connection with their possibilities for urgent mail and newspaper work. Newspaper proprietors might easily find it advantageous to use high-speed aeroplanes for conveyance of copy, stereotypes, photos, etc., between such centers as London, Paris, Glasgow, and Dublin.

There is no reason why, before long, business men and others should not be telephoning to aerodromes and ordering their machines to convoy them to Paris or Brussels. Last summer the Royal Air Force established the communication squadron and between August and November 279 passenger cross-country flights such as to Paris, Nancy, Dunkirk, Manchester, York, and Birmingham were made without a single crash. Many very distinguished people were transported. Two D. H.–4 machines, required to transport Mr. Paul Cravath and

Mr. Crosby of the American mission, made a record trip to Paris and back on the same day in 4 hours and 20 minutes.

On another occasion a trip was made from Manchester, a distance of 170 miles, in 1 hour and 25 minutes. One of the pilots of this squadron, who was over 40 years old, had flown across the Channel no fewer than 287 times, frequently in bad weather.

Maj. Gen. Sykes, having indicated the future usefulness of the aeroplane for exploration, railway surveying, mapping of shoals and reefs, proceeded:

Even when agreement has been reached at the international conference, much diplomatic machinery remains to be set in motion before aerial services can be actually started. The Royal Air Force has lately been engaged in preparation for a postal service across the North Sea, but as we are still in a state of war there is the difficulty of the 3-mile territorial water limit, upon which agreement must be reached.

Note the absence of discussion of questions of expense, weather, etc. Also it may be questioned whether flying is as safe as the older means of transport. This popular subject has given rise to much of the unsound newspaper talk.

Conclusions.

Everything now rests with the Government, and until some policy is announced it will be impossible to forecast the future of the air. However, it is certain that in view of her superiority in machines, experienced men, and large amounts of money which have been invested by the Government and private individuals in aviation, England hopes to maintain large military and commercial air fleets.

SHIP AEROPLANES—AIRCRAFT TECHNICAL NOTE NO. 157.

Source: Commander J. C. Hunsaker, C. C., U. S. N.

6 August, 1919.

(10212F.)

The following table describes the area and power loading for a number of aeroplanes which have been used, or are proposed for use, for shipboard use:

Type.	Engine.	Horsepower.	Weight.	Area (square feet).	Pounds per square foot.	Pounds per horsepower.
Sopwith 1½ Strutter	Clerget	130	2,342	353	6.6	18.0
Parnali Panther	B. R.-2	230	2,376	336	7.0	10.3
Sopwith Camel	Clerget	130	1,453	240	6.1	11.2
Hanriot	do	130	1,605	194	8.3	12.3
JN-4 H	Hispano-Suiza	150	2,145	353	6.1	14.3
Loening M-8	do	300	2,608	253	10.4	8.7
S. E. 5	do	180	2,060	240	8.6	11.4
USXB-1A	do	300	2,910	403	7.4	9.7
AS	do	300	2,695	385	7.0	9.0
LS	do	300	2,520	297	8.5	8.4
LB	do	300	2,280	350	6.5	7.6
Loening Cat	Lawrence	55	765	116	6.6	14.0
Loening Kitten	do	55	584	72	8.1	10.6

It can generally be admitted that the essential requirement of quick getaway requires, first, a low value of the pounds per square foot of wing area, in order that flight speed may be reached at a fairly low velocity, and, second, a low value of the pounds per horsepower, in order that the plane shall accelerate quickly and attain its flight speed before losing too much altitude. If we leave out of consideration special wings of high-lift characteristic and specially built wings of low-lift characteristic designed for high speed, such as the Sloane, it would appear that these coefficients of area and power loading should be sufficient to judge, in a rough way, the ability of any given plane to fly off a ship's turret.

Examination of the list shows that the Sopwith 1½ Strutter has a very low wing loading, but the power loading of 18 pounds per horsepower is high. Practical experience has shown that this plane can be used to fly off a turret, provided there is a good head wind, but that it can not be used under unfavorable conditions, such as a calm. The British are replacing it with a machine called the Parnall Panther, in which it will be seen that the wind loading is substantially similar, but the power loading has been materially reduced. Tests on this machine are understood to be very satisfactory.

The Sopwith Camel, a single seater, has an abnormally low wing loading combined with a power loading of 11.2 which may also be considered low. It is understood that this plane can fly off a turret even in a calm.

We may, therefore, conclude that any plane which has loading characteristics which lie between those given for the Camel and those given for the 1½ Strutter can be used to fly off a turret.

Examination of the list indicates that the Hanriot might be used under favorable conditions for this purpose and that the *JN–4* should be less satisfactory than the Camel, but better than the 1½ Strutter.

The Loening M–8 has a high wing loading, namely, 10.4, which is equivalent to a biplane of about 9 pounds per square foot. This loading is, however, high, and although the power loading is lower than the Camel, yet there must remain some doubt as to the ability of this machine to accelerate sufficiently to attain the relatively high-flying speed required by its wings. Experiments will shortly be made with this plane provided with larger wings, which should materially improve its availability for ship work.

The *S. E. 5* has a reasonably low-power loading, but the wing loading is high, and it is believed the *S. E. 5* could only fly off a turret under favorable circumstances. It is no better than the Hanriot referred to above.

The *USXB–A* is now having its trials at McCook Field, and should be as good as the Parnall Panther, so far as this method of comparison can bring out.

The Loening boat (LB), Loening seaplane (LS) and Aeromarine seaplane (AS), now under contracts, indicate that if the contractors succeed in building satisfactory machines to the contract weights, all of these planes should be able to fly off turrets under favorable conditions.

It must be remembered, however, that in order successfully to launch aeroplanes from a turret some form of launching gear must be added to the machine which, if it be of any great weight, will decrease the acceleration and somewhat delay the attainment of flying speed. The flying speed is not affected by the design of the launching gear, because such gear will not be carried into the air.

AVIATION SCHOOLS IN NORWAY.

Source: Reliable.

23 July, 1919.

(11462.)

A school for civilian aviators has recently been opened at Gardermoen, near Lillehammer, Norway. This is said to be the first school of its kind in Norway. Two companies are interested in this undertaking, these being: A/S Norsk Flyverskole and A/S Norsk Luft Kraft. Eight Caudron machines have been purchased from England. The fee is to be kr. 2,000 ($536), with a guaranty deposit of kr. 3,000 ($804).

OPERATIONS.

PASSAGE OF THE PACIFIC FLEET THROUGH THE CANAL.

Source: The Panama Canal Record.

30 July, 1919.

(3190.)

[This article is not confidential but published for informaton of the service.]

The passage of 33 vessels of the Pacific Fleet of the United States Navy through the canal, 30 of them on the two days, July 24 and 25, and the supply of large orders of coal, fuel oil, and foodstuffs to the squadron constituted the largest operation which has been effected through the canal to date. The ships were on their way from Atlantic waters, many of them recently from the war zone, to their new station in the Pacific Ocean, their next stop beyond the canal to be at San Diego, Calif. The statement below shows the time used by each ship in passing through the canal and the time required for handling each of them through the three sets of locks. The destroyers were handled in groups, with a canal pilot in charge of three destroyers, and in the passage through the locks six of these 310-foot vessels were placed in one chamber together, in two ranks of three each, lashed together. The other ships were handled individually, with a canal pilot on each. Two of these, the dreadnoughts *Mississippi* and *New Mexico*, are the largest ships which have ever passed through the canal or visited this part of the world; they are 624 feet long and 97 feet 4½ inches in the beam, with a displacement of 32,000 tons. The *Mississippi* had a draft at time of transit of 32 feet 8 inches.

The total length of ships in the fleet was 13,409 feet. Placed stem to stern, they would reach over 2½ miles. Their aggregate displacement was approximately 265,000 tons. Prior to the coming of the *Mississippi* and the *New Mexico*, the largest ship to have passed through the canal was the merchantman *Minnesota*, 622 feet in length by 73 feet 5 inches beam, with a gross tonnage, Panama Canal measurement, of 22,053 tons.

The *Mississippi* went through the canal from Cristobal to Balboa in 10 hours and 46 minutes, 3 hours and 43 minutes of which were spent in the locks. The *New Mexico*, spending 13 hours and 31 minutes at anchor in Gatun Lake, completed transit in 25 hours and 25 minutes, being under way 11 hours and 54 minutes.

Eliminating interruptions due to fueling, actual travel times of transit in the case of the several dreadnaughts (Cristobal to Balboa) were as follows:

New Mexico, 11 hours, 39 minutes; *Wyoming*, 10 hours, 56 minutes; *New York*, 10 hours, 11 minutes; *Texas*, 10 hours, 28 minutes; *Mississippi*, 10 hours, 46 minutes; *Arkansas*, 10 hours, 1 minute. These actual travel times are in excess of the time necessary for direct transit, by reason of delays involved in getting away from the coaling dock, discharging liberty parties, and other features. Six hundred men were discharged from each of the big ships at Pedro Miguel Lock, and during the time that they were disembarking the emptying of the chambers was suspended. The *Arkansas* was less affected by such features than the others, and her actual time of transit consequently most nearly represents the performance of the canal in the case of these ships. In her case, however, delay resulted from congestion at the locks, due to the slowing down of ships ahead for reasons beyond canal control, so that normal travel time of transit for the dreadnoughts might be represented by a figure somewhat less than that of the time of transit of the *Arkansas*.

Time of arrival at Balboa is taken to the moment the vessel passes abreast of the port captain's office, after which the vessel ties up in the harbor or passes to sea or to outside anchorage, as in the case of the dreadnoughts. Thirty minutes is an approximate figure for the time required to pass from the point opposite the port captain's office to the Pacific end of the dredged channel.

The fleet was handled smoothly and without mishap or unwarranted delays. No interruption of the normal commercial traffic through the canal was occasioned; on account of a strike of marine workers in United States ports, the commercial traffic was less than usual.

The canal plants furnished 13,000 tons of coal and 48,233 barrels of fuel oil to the fleet. Ten thousand five hundred tons of coal were furnished from the Cristobal plant, including 1,200 tons sent in barges to Gatun Lake for delivery to the *Arkansas* and the *Texas*. The Balboa coaling plant supplied 2,500 tons, of which 500 were delivered by barges, the remainder direct from the reloaders of the plant. The fuel oil was taken from a stock maintained by the Navy in canal tanks. Two dreadnoughts and 4 destroyers received 20,334.50 barrels at Cristobal, and 19 destroyers received 27,888.97 barrels at Balboa.

Table of transit of Pacific Fleet through the canal.

	Left Cristobal.	Gatun Locks.				Pedro Miguel Locks.				Miraflores Locks.				Arrived at Balboa.	Total time in locks.		Total time for transit.	
		Arrived.	Left.	Time in locks.		Arrived.	Left.	Time in locks.		Arrived.	Left.	Time in locks.						
July 24.				*Hrs.*	*Mins.*			*Hrs.*	*Mins.*			*Hrs.*	*Mins.*		*Hrs.*	*Mins.*	*Hrs.*	*Mins.*
Battleship Georgia	5.25 a. m.	6.33	7.33	1	00	10.30	11.01	0	31	11.21	12.07	0	46	1.13 p. m.	2	17	7	48
Destroyer Elliot	11.00 a. m.	11.13	1.54	2	41	4.07	5.55	1	48	6.15	8.00	1	45	9.05 p. m.	6	14	10	5
Destroyer Buchanan	11.00 a. m.	12.00	1.54	1	54	4.12	5.55	1	43	6.15	8.00	1	45	8.30 p. m.	5	22	9	30
Destroyer Philip	11.00 a. m.	11.33	1.54	2	21	4.19	5.55	1	36	6.15	8.00	1	45	8.25 p. m.	5	42	9	25
Destroyer Boggs	11.00 a. m.	11.37	2.00	2	23	4.26	5.58	1	32	6.34	8.35	2	1	9.00 p. m.	6	6	10	00
Destroyer Dent	11.00 a. m.	11.42	2.00	2	18	4.35	5.58	1	23	6.34	8.35	2	1	9.00 p. m.	5	42	10	00
Destroyer Waters	11.00 a. m.	12.02	2.00	1	58	4.47	5.58	1	11	6.34	8.35	2	1	8.44 p. m.	5	10	9	44
Destroyer Yarnall	11.00 a. m.	12.10	2.10	2	00	4.50	6.15	1	25	6.43	8.35	1	52	9.07 p. m.	5	17	10	7
Destroyer Wickes	11.00 a. m.	12.12	2.10	1	58	4.57	6.15	1	18	6.43	8.45	2	2	9.26 p. m.	5	18	10	26
Destroyer Woolsey	11.00 a. m.	12.17	2.10	1	53	5.02	6.15	1	13	6.43	8.40	1	57	9.21 p. m.	5	3	10	21
Destroyer Tarbell	11.00 a. m.	12.33	2.14	1	41	5.07	6.15	1	8	6.44	8.35	1	51	9.10 p. m.	4	40	10	10
Cruiser Birmingham	12.55 p. m.	1.55	3.40	1	45	5.55	7.08	1	13	7.25	9.35	2	10	10.10 p. m.	5	8	9	15
Destroyer Crosby	12.25 p. m.	1.45	4.05	2	20	6.36	8.40	2	4	9.20	11.06	1	46	11.53 p. m.	6	10	11	28
Destroyer Ward	12.25 p. m.	1.02	4.05	3	3	6.09	7.37	1	28	8.45	11.00	2	15	11.38 p. m.	6	46	11	13
Destroyer Montgomery	12.25 p. m.	1.13	4.05	2	52	6.20	8.25	2	5	8.45	11.00	2	15	11.20 p. m.	7	12	10	55
Destroyer Lamberton	12.25 p. m.	1.15	4.14	2	59	6.35	8.53	2	18	9.20	11.06	1	46	11.41 p. m.	7	3	11	16
Destroyer Ludlow	12.25 p. m.	1.24	4.14	2	50	6.30	9.00	2	30	9.20	11.06	1	46	11.56 p. m.	7	6	11	31
Fuel ship Vulcan	3.10 p. m.	4.25	5.41	1	16	9.16	9.54	0	38	10.17	11.05	0	48	11.43 p. m.	2	42	8	33
Destroyer Breeze	3.10 p. m.	4.32	5.42	1	10	8.05	11.09	3	4	11.49	1.19	1	30	1.32 a. m.	5	44	10	22
Destroyer Thatcher	4.32 p. m.	5.24	7.47	2	23	10.30	11.09	0	39	11.49	1.19	1	30	1.40 a. m.	4	32	9	8
Destroyer Ramsay	4.57 p. m.	5.55	7.47	1	52	10.36	11.37	1	1	11.49	1.19	1	30	1.40 a. m.	4	23	8	43
Destroyer Walker	4.57 p. m.	6.14	8.00	1	46	10.45	11.37	0	52	12.05	1.30	1	25	1.50 a. m.	4	3	8	53
Destroyer Palmer	5.16 p. m.	6.06	8.00	1	54	10.35	11.15	0	40	12.05	1.30	1	25	1.50 a. m.	3	59	8	34
Destroyer Gamble	5.16 p. m.	6.23	8.00	1	37	10.53	11.45	0	52	12.05	1.30	1	25	2.25 a. m.	3	54	9	9

Table of transit of Pacific Fleet through the canal.

	Left Cristobal.	Gaton Locks.				Pedro Miguel Locks.				Miraflores Locks.				Arrived at Balboa.	Total time in locks.		Total time for transit.	
		Arrived.	Left.	Time in locks.		Arrived.	Left.	Time in locks.		Arrived.	Left.	Time in locks.						
				Hrs.	*Mins.*			*Hrs.*	*Mins.*			*Hrs.*	*Mins.*		*Hrs.*	*Mins.*	*Hrs.*	*Mins.*
July 25.																		
Battleship Arkansas [1]	7.25 a. m.	8.09	9.35	1	26	1.38	2.55	1	17	3.35	4.43	1	8	5.11 p. m.	3	51	33	46
Battleship Texas [2]	7.35 a. m.	8.27	9.53	1	26	12.11	1.25	1	14	1.58	3.09	1	11	3.40 p. m.	3	51	32	5
Battleship Vermont	8.48 a. m.	9.40	11.05	1	25	2.11	2.45	0	34	3.08	3.53	0	45	4.20 p. m.	2	44	7	32
Auxiliary Prairie	10.25 a. m.	11.20	12.20	1	00	3.30	4.40	1	10	5.01	5.51	0	50	6.14 p. m.	3	0	7	49
Battleship New Mexico [3]	12.10 p. m.	2.49	4.11	1	22	10.06	11.13	1	7	11.48	1.00	1	12	1.35 p. m.	3	41	25	25
Battleship New York [4]	3.32 p. m.	5.07	6.19	1	12	11.48	12.45	0	57	1.31	2.29	0	58	2.57 p. m.	3	7	23	25
Battleship Wyoming [5]	4.05 p. m.	5.46	7.20	1	34	10.40	11.35	0	55	12.10	1.20	1	11	1.55 p. m.	3	40	21	50
July 26.																		
Battleship Mississippi	5.54 a. m.	7.19	8.35	1	16	12.57	2.19	1	22	2.55	4.00	1	5	4.40 p. m.	3	43	10	46
July 27.																		
Destroyer Rathburn	6.50 a. m.	7.16	8.20	1	4	10.19	10.43	0	24	10.56	11.32	0	36	11.52 a. m.	2	4	5	2
Supply ship Vestal	8.45 a. m.	8.19	10.17	1	58	1.04	1.40	0	36	1.57	3.19	1	22	3.50 p. m.	3	56	7	5

[1] Arkansas anchored in Gatun Lake at 9.53 a. m., July 25, and weighed anchor at 9.20 a. m. on 26th; 23 hours 27 minutes at anchor.
[2] Texas anchored in Gatun Lake at 10.25 a. m. on 25th and weighed anchor at 7.30 on 26th; 21 hours 5 minutes at anchor.
[3] New Mexico anchored in Gatun Lake at 4.29 p. m., weighed anchor at 6 a. m. on 26th; 13 hours 31 minutes at anchor.
[4] New York anchored in Gatun Lake at 6.35 p. m., weighed anchor at 7.43 a. m. on 26th; 13 hours 8 minutes at anchor.
[5] Wyoming anchored in Gatun Lake at 7.44 p. m., weighed anchor at 6.14 a. m., July 26; 10 hours 30 minutes at anchor.

ORGANIZATION OF FRENCH NAVAL FORCES.

Source: "La Vie Maritime."

2 August, 1919.

(The following article is not confidential but published for information of the service.)

A department order of June 25, 1919, determines the organization of our naval forces in the Mediterranean. This organization is stated as being provisional, which means, without doubt, that this provisional will continue until Parliament or public opinion prescribes changes in this organization which, moreover, is entirely facade.

We shall, therefore, have in the Mediterranean:

1. A vice admiral, commander in chief (Vice Admiral de Bon), having at his disposal a division of two ships—*Provence* and *Jurien de la Graviere.*

2. A vice admiral, commandant of the first squadron (Vice Admiral Charlier), consisting of the battleships *Courbet*, *Jean-Bart*, *France*, *Paris*, *Lorraine*, *Bretagne*, with a rear admiral (Rear Admiral Violette) under him.

3. One second squadron composed as follows:

A rear admiral (Rear Admiral de Marguerye), division of battleships; *Voltaire*, *Condorcet*, *Diderot.*

A rear admiral (Rear Admiral Lejay), division of cruisers; *Jules*, *Michelet*, *Waldeck Rousseau*, *Ernest-Renan.*

4. Four flotillas of destroyers of six units each, of which two with complete complements and two with reserve complements.

5. Two mine layers, of which one armed for the Black Sea.

6. The sloops *Antares*, *Algol*, *Altair;* the dispatch vessels *Escaut*, *Scarpe*, *Suippe*, and *Yser;* the gunboats *Tapageuse*, *Courageuse*, and *Agile.*

7. The mine sweepers *Gres*, *Marbre*, *Rateau*, *and Coquelicot*, together with four chasers for operations in the Black Sea.

8. A rear admiral (Rear Admiral C. A. Mornet) commands the Syrian division at Port Said, comprising the yacht *Phenix*, the cruiser *Cassard*, three gunboats, and two mine sweepers.

9. A rear admiral (Rear Admiral Excelmans) commands the division of the naval bases of the Orient, comprising a villa on the Bosphorus, serving as quarters for the admiral and his staff, the yacht *Luciole*, a hulk *Le Tourville* at Constantinople, the water boat *Shamrock* at Salonica, and half a dozen harbor-service vessels.

10. The Danube flotilla.—Six gunboats and 10 vedettes.

11. One oil ship and one repair ship.

12. Four ships, including the *Guichen*, for service on the line of supplies Taranto–Stea.

To the above list there should be added:

One rear admiral (Rear Admiral Ratye) at Venice, for supervision of matters on the Dalmatian Coast. His yacht, the *Atmah*, has just been placed out of commission.

We shall therefore have, commanding in the Mediterranean, without counting staffs of ports and navy yards, two vice admirals and six rear admirals, or one vice admiral less than during the war.

It is to be remarked that this fleet comprises 10 battleships and 3 unprotected cruisers, whereas the Department Circular of May 10, which was suspended on the day following the assumption of duty of the new General Staff, provided as follows:

1. A squadron of seven battleships and three protected cruisers.

2. An instruction squadron, consisting of three battleships plus three protected cruisers and one school division.

If it be noted that the three protected cruisers, which the dispatch of May 10 included, with reduced complements, are likewise in reserve according to the ruling of the circular of June 25, it may be said that the two organizations are equivalent, with the exception of a vice admiral.

The school division is organized on a footing greatly superior to that before the war.

Three battleships are assigned to it, the *Patrie*, *Republique*, and *Verite*, from which the heavy guns will be removed to permit of installing an additional deck for quarters.

Furthermore, the *Pothuau*, which is likewise having its after turret removed and is being transformed.

An imposing number of small vessels—destroyers, gunboats, torpedo boats, and vedettes.

The battleships *Saint Louis* and *Jaureguiberry*, which serve as quarters for the school for machinists and firemen, whose quarters at Le Mouillon were some months ago assigned to the school for electricians, those for radiotelegraphy remaining on the old coast-protection ship *Trehouart*, which is an annex of the school for radiotelegraphy.

Before the war the school for machinists and firemen was established on shore, in extensive premises, thoroughly fitted up at Le Mouillon. All the other specialties—gunboats, torpedo boats, electricians were afloat and distributed on old battleships—*Marceau*, *Jaureguiberry*, and *Charlemagne*. A cruiser, the *Jules Michelet*, was assigned to the school for target practice.

The *Pothuau* had the same assignment as to-day—experimental commission for practical target practice afloat.

It will be noted that the school division has been increased since everything seemed to indicate that our armaments would be reduced.

On the other hand, the battleship *Justice* is expected at Brest to become the center of another group of school ships—boatswain's mates, chief quartermasters (signals), carpenters.

The composition of the staff of the vice admiral, commander in chief of the Mediterranean, is very suggestive. It comprises: One rear admiral, chief of staff; one captain, assistant chief of staff; one commander, chief of service at the rear; three lieutenant commanders; three lieutenants, aids; one ensign, ordnance officer; and one paymaster, first class.

This staff is divided into sections, viz, service at the front and service at the rear. These innovations mark an interesting progress.

During the war, Vice Admiral de Lapeyrere, commander in chief, who was called the King of the Sea, had as staff only: One rear admiral, chief of staff; one commander, assistant chief of staff; two lieutenant, aids; and one ensign, ordnance officer.

BRITISH SHIPBUILDING.

Source: Reliable.

24 July, 1919.

(2226A.)

The returns of statistics issued by Lloyd's Register show that during the quarter ending June 30, 1919, British shipyards launched 206 vessels of 527,891 tons gross, compared with 74 vessels of 205,316 tons gross in the first quarter of this year.

At the same time as this larger output in new construction has been accomplished, very considerable progress has been made in the reconditioning merchant vessels which were requisitioned by the Admiralty; in addition, 183 new vessels of 659,980 tons gross were begun in the June quarter. The amount of new tonnage in course of construction in shipyards in the United Kingdom totaled 782 vessels of 2,524,050 tons gross at the end of June, as against 657 vessels of 2,254,845 tons gross at the end of March.

While an output of 527,891 tons gross is roughly equal to prewar production, the capacity for construction has greatly increased, and during the war was officially stated to amount to 3,000,000 tons annually. Unless very much greater progress is made during the remaining 6 months of the current year, the total output during the whole 12 months will aggregate only about 1,750,000 tons gross (or little more than half the capacity of the yards), and even this total will be dependent to a very great extent on future labor conditions and demands.

MISCELLANEOUS.

JAPAN'S MERCHANT MARINE.

6 August, 1919.

Source: Reliable.

(7410C.)

["While this report is incomplete and inaccurate in several instances, it is probably the most extensive article on the subject published recently in Japan and contains comments which throw interesting side lights on the future of Japan's mercantile marine and on the marine policies now being advocated."]

Introduction.

In glancing over the history of shipping of the world, an inseparable connection between war and ships is usually found. The wars of ancient times were limited to land operations and shipping was only an auxiliary organ of transportation for the soldiers and supplies. Since the Middle Ages ships have been utilized for this purpose. In recent times shipping has become a most important factor in the successful waging of war. Maritime affairs have assumed a position of conspicuous importance both in peace and in war. Our marine development has increased and the foundations of our shipping industry have been strengthened by every war in which the nation has participated. In the present war in particular, due to the great extent of the field of operations and the unprecedented destructive powers involved, the Japanese mercantile marine has developed with remarkable rapidity. But the present state of our shipping can not be said to be wholly satisfactory, and in this transition period, when we are changing from a war to a peace footing, the strictest attention should be given to our plans and policies.

Following is given first an account of the development of our shipbuilding industry since the beginning of the World War, after which the policy for the future will be examined.

Registered Shipping.

Since the beginning of the war the Japanese mercantile marine has developed at a very rapid rate. The following figures of the number of steamships registered demonstrates this increase:

REGISTERED STEAMSHIPS SHOWING THE NUMBER AND GROSS TONNAGE.

Year.	Under 500 tons.		Between 500 and 1,000 tons.		Between 1,000 and 3,000 tons.		Between 3,000 and 6,000 tons.		Between 6,000 and 10,000 tons.	
	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
1912	1,457	147,243	138	99,971	241	472,610	108	417,404	36	243,010
1913	1,529	160,621	137	99,626	246	484,489	117	448,506	38	259,355
1914	1,577	164,495	142	103,581	246	486,429	121	463,974	39	263,903
1915	1,566	163,189	150	110,403	244	484,622	137	558,560	29	215,322
1916	1,546	157,099	166	118,455	265	521,675	142	406,009	33	245,325
1917	1,503	149,329	201	145,260	272	529,464	160	660,457	37	270,726

Year.	Above 10,000 tons.		Total.		Average tonnage.
	Number.	Tonnage.	Number.	Tonnage.	
1912	3	40,271	1,981	1,430,229	722
1913	5	61,344	2,072	1,513,941	730
1914	8	94,143	2,133	1,577,025	749
1915	6	72,604	2,132	1,604,900	752
1916	6	71,905	2,159	1,696,631	785
1917	6	71,896	2,179	1,827,132	838

In the foregoing figures only those vessels registered in Japan proper are included: The steamships registered in Korea, Formosa, and Kwantung Province (Darien) at the end of 1916 amounted to over 240,000 tons, and it is estimated that such vessels reached 300,000 tons by the end of 1917. Therefore the total tonnage of registered steamships in Japan at the close of 1917 amounted to over 2,127,132 tons, showing a most conspicuous development.

Japanese Shipping Routes.

As a result of the early promulgation by the Government of the shipping protection and subsidy laws, and the continued careful attention to the establishment of trade routes coastwise lines were first established and then gradually regular lines to other countries were opened. These lines were by slow degrees extended to distant parts of the world.

The Japanse steamship lines already established at the beginning of the war were as follows:

European Line.....Nippon Yusen Kaisha.
North American run:
Puget Sound Line.....Nippon Yusen Kaisha.
Puget Sound Line.....Osaka Shosen Kaisha.
San Francisco Line.....Toyo Kisen Kaisha.
South American West Coast Line.....Toyo Kisen Kaisha.
Australian Line.....Nippon Yusen Kaisha.
Indian run:
Bombay Line.....Nippon Yusen Kaisha.
Bombay Line.....Osaka Shosen Kaisha.
Calcutta Line.....Nanyo Yusen Kaisha.

China run:

Shanghai Line	Nippon Yusen Kaisha.
Yangtse River Line	Nisshin Kisen Kaisha.
North China Line	Nippon Yusen Kaisha.
North China Line	Osaka Shosen Kaisha.
Tsingtao Line	Harada Kisen Kaisha.
Darien Line	Osaka Shosen Kaisha.
Darien-Shanghai Line	Osaka Shosen Kaisha.
Vladivostok Line	Nippon Yusen Kaisha.
Vladivostok Line	Osaka Shosen Kaisha.

There were practically no lines of tramp steamers running on regular routes before the war.

The war gave our merchant marine an excellent opening. The world scarcity of bottoms enabled us to extend our far-seas lines farther and farther. According to an investigation made by the Yamashita Kisen Kaisha in June, 1918, the allotment of vessels outside of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Toyo Kisen Kaisha to the various routes was as follows:

	Tons.
North America	354,186
Australia	60,548
Port Said and Mediterranean	99,411
India	129,269
South Seas	140,923
Total	786,337

According to information collected by the same firm the routes opened from the beginning of the war to October, 1918, were as follows:

Nippon Yusen Kaisha.

1. *Around the world.*—Japan, Singapore, Delagao Bay, Cape Town, Europe, New York, North America, South America, Panama, Japan. One ship per month.

2. *New York Line.*—Hongkong, Philippines, Shanghai, Moji, Kobe, Mokkaichi, Yokohama, San Francisco, Panama, Colon, New York. One ship every four weeks.

3. *New Zealand Line.*—Japan, Aukland, Wellington, Australia. One ship every two months.

4. *South African and South American Line.*—Japan, Singapore, South Africa, Santos, Rio de Janeiro, Buenos Aires, New York, Panama, Japan. Four ships per year.

5. *South Seas Lines.*—(*a*) Main line: Yokohama, Yokosuka, Futami, Saigon, Truk. One ship per month.

(*b*) Branch lines:

(1) Truk, Ponape, Kusaie, Truk. One ship per month.

(2) Truk, Yap, Parao, Anguar. One ship per month.

6. *Port Said Line.*—Japan, Singapore, Port Said, Bombay, Singapore. One ship per month.

7. *Mediterranean Line.*—Port Said, Marseilles. One ship per month.

8. *Japan-Java Line.*—Japan, Java, Japan. Two ships per month.

9. *Java-Calcutta Line.*—Japan, Java, Calcutta, Japan. Two ships per month.

10. *Calcutta-New York Line.*—Japan, Java, Calcutta, Colombo, Cape Town, New York, Calcutta, Japan. One ship per month.

11. *Calcutta-Seattle Line.*—Calcutta, Japan, Seattle, Japan. One ship per month.

Osaka Shosen Kaisha.

1. *Australian Line.*—Yokohama, Nagoya, Kobe, Manila, Sidney, Melbourne. One ship per month.

2. *South American Line.*—Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Durban, Cape Town, Rio de Janeiro, Santos, Buenos Aires. Seven ships per year.

3. *South Seas Lines.*—(*a*) Main line: Osaka, Kobe, Moji, Keelung, Amoy, Hongkong, Manila, Batavia, Samarang, Soerabaya, Macassar, Sandakan, Hongkong, Takao, Keelung, Kobe. One ship per month.

(*b*) Branch lines:

(1) Singapore, Bangkok, Pontianaka, Batavia. One ship per month.

(2) Ceylon, Rangoon, Singapore, Batavia. Two ships per month.

(3) Singapore, Port Swellenham, Deli, Palembang. Two ships per month.

4. *South European Line.*—Yokohama, Kobe, Singapore, Sudan, Port Said, Marseilles. One ship per month.

Yamashita Kisen Kaisha.

1. *Japan-India Line.*—Japan, Dairen, Hongkong, Singapore, Calcutta, Colombo, Bombay, Colombo, Calcutta, Singapore, Manila, Japan, Pacific coast of the United States, Japan, or Japan via Vladivostok. One ship per month.

2. *South Seas Lines.*—(*a*) Singapore, Saigon, Hongkong; (*b*) Singapore, Borneo, Java, Rangoon; (*c*) Singapore, Calcutta, Colombo, Bombay, Karachi, Port Said. About two ships per month for all three routes.

Mitsubishi Shoji Kaisha.

1. *South Seas Lines.*—(*a*) Main line: Kobe, Moji, Keelung, Hongkong, Manila, Singapore. One ship per month.

(*b*) Branch lines:

(1) Singapore, Bangkok, Saigon, Haifong, Hongkong, Swatow, Amoy. One ship every two months.

(2) Singapore, Sarawak, Labuan, Jesselton, Kudat, Sandakan, Tawao. One ship per month.

(3) Keelung, Amoy, Swatow, Hongkong, Canton, Manila. One ship every two months.

2. *Japan-China Line.*—Osaka, Kobe, Moji, Shanghai, Hankow. One ship per month.

Nisshin Kisen Kaisha.

Japan-China Line.—Osaka, Kobe, Moji, Shanghai, Hankow. One ship every four weeks.

Taiyo Kaiun Kaisha.

1. *Japan-North American Lines.*—(*a*) Kobe, Yokohama, Seattle. Two or three ships per month. (*b*) Kobe, Yokohama, San Francisco. One ship per month.

2. *Manchuria-North American Line.*—Japan, Dairen, Tienstin, Chemulpo, North America, Japan. One or two ships per month.

3. *Hongkong-North American Line.*—Kobe, Hongkong, Seattle, Japan. One ship per month.

4. *South Seas-North American Line.*—Kobe, Singapore, Seattle, Japan. One ship per month.

5. *Japan-South Seas Line.*—Kobe, Hongkong, Batavia, Samarang, Soerabaya. One ship per month.

6. *Japan-Australia Line.*—Kobe, Yokohama, Sidney. Melbourne. One ship per month.

7. *Dairen-Seattle Line.*—Dairen, Seattle, Yokohama, Kobe. One ship per month.

In addition to the above, the company dispatches vessels at irregular intervals between North America and Shanghai, Manila, Java, Calcutta, and Colombo.

Murai Kisen Kaisha.

Kobe, Dairen, Cheefo, Tsingtao, Shanghai, Hongkong, Canton, Formosa, Kobe. Three ships per month.

Decrease of World's Shipping During the War.

The following table gives the losses, approximately, sustained by the merchant shipping of the allied and neutral countries during the war through enemy action and loss by accident:

Year.	Great Britain.	Others.	Total.
1914 (from August)	468,728	212,635	681,363
1915	1,103,379	621,341	1,724,720
1916	1,497,848	1,300,018	2,797,866
1917	4,009,537	2,614,086	6,623,623
1918 (to October)	1,924,512	1,273,878	3,198,390
Total	9,004,004	6,021,958	15,025,962

The following table gives the enemy tonnage captured and allied tonnage built (except Russia):

Year.	Great Britain.	Others.	Total.
1914	675,610	337,310	1,012,920
1915	650,919	551,081	1,202,000
1916	541,552	1,146,448	1,688,000
1917	1,163,474	1,774,312	2,937,786
1918	1,310,741	2,698,080	4,008,821
Total	4,342,296	6,507,231	10,849,527

Total Losses of Merchant Vessels Other Than German.

Total tonnage of ships lost	15,052,962
Total tonnage of ships built	10,849,527
Difference (loss)	4,203,435
Enemy ships captured and used	2,392,675
Difference (loss)	1,810,760

The total loss of merchant ships, except enemy vessels, throughout the world during the war amounted to 15,052,962 tons, while the ships built, except those built in enemy countries, amounted to 10,849,527 tons. However, the absolute loss of enemy vessels during the war is not included in the above computation, while the merchant ships of the allied countries captured by the enemy are included, consequently it is impossible as yet to compute the total loss of tonnage in the world. But, although there are no exact statistics of the loss of enemy merchant vessels, a director of the Hamburg-American Line stated that, compared with prewar figures, the German merchant marine had decreased to one-third. According to Lloyd's Register of Shipping for July, 1914, the German merchant marine amounted to 5,499,296 tons, two-thirds of which, 3,639,530 tons, we may surmise to represent the amount of the loss. The rate of loss may be taken as the same in the Austro-Hungarian and Turkish merchant marines, giving a loss of 792,585 tons out of 1,188,877 tons. This makes the total loss on the enemy side over 4,432,000 tons.

The merchant ships seized by the enemy countries include 54,214 tons of allied shipping, 93,487 tons of neutral shipping, and 12 vessels of unknown tonnage which were in German ports at the outbreak of the war. Therefore the computation of the total world loss of tonnage during the war would be as follows:

	Tons.	Tons.
Absolute loss outside of enemy countries	4,203,000	
Absolute loss of enemy countries	4,432,000	
Total		8,635,000

But in the above are included:

Enemy vessels seized and used by the Allies	2,392,675
Allied vessels interned by the enemy	210,653
Allied and neutral vessels captured by the enemy	147,800
Total, about	2,751,000
Difference, representing absolute world loss	5,884,000

The above only shows the actual decrease of the world's tonnage since the outbreak of the war. But, in compliance with the general trend of the world's shipping before the war, the merchant marine of each country was gradually growing year by year. Necessarily, therefore, we must take into consideration the fact that there would have been a proportionate increase of shipping if the war had not broken out. Now, the increase in all countries for the three years previous to the war, according to Lloyd's register, was as follows:

1912	1,452,756
1913	2,373,019
1914	2,119,439

The world's shipping, therefore, was increasing at the rate of about 1,980,000 tons per year, taking the average of these three years. If, then, there had been no war, the total increase in the world's shipping by the end of 1918 would have amounted to 7,920,000 tons. If this is added to the total world's tonnage in 1914 of 49,000,000 tons, it makes a total of 56,920,000 tons; but, on the contrary, October, 1918, showed an actual decrease of about 5,884,000 tons. It is necessary, therefore, to estimate the loss in the world's tonnage as very much greater than that computed above.

Shipbuilding in Japan During the War.

The great decrease in shipping throughout the world has been shown above. Our shipbuilding industry, confronted with the necessity of meeting this deficit, made a remarkable development. Orders for new ships suddenly increased and the shipyards themselves, anticipating the future of the marine transportation world, began to build vessels on their own account. Looking at the statistics of the shipyards and shipbuilding since 1912, we find the following development:

Year.	Ships at end of year.	Steamships built.		Sailing vessels built.		Total.	
		Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
1912	226	168	48,155	372	23,899	540	72,054
1913	230	115	51,525	659	43,598	774	95,123
1914	238	79	82,873	557	34,428	636	117,401
1915	209	63	51,431	411	26,024	474	77,455
1916	219	74	144,024	519	45,831	613	189,855
1917	335	224	263,820	1,354	126,773	1,598	390,593

The following tables give the carrying capacity of the newly built steam and sailing vessels launched in each year from 1912 to 1917, inclusive:

STEAMSHIPS.

Year.	Under 500 tons.		Between 500 and 1,000 tons.		Between 1,000 and 3,000 tons.		Between 3,000 and 6,000 tons.		Between 6,000 and 10,000 tons.	
	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.
1912	160	20,373	1	581	2	4,333	3	9,815	2	13,053
1913	101	10,595	10	6,452	.....	.....	1	3,875	3	30,603
1914	60	5,476	5	3,357	5	6,862	3	11,572	3	21,997
1915	46	4,424	9	6,502	3	6,950	2	7,162	3	26,373
1916	39	3,567	18	13,052	13	21,824	18	61,857	6	43,724
1917	134	22,233	45	35,472	31	46,024	30	132,010	4	28,081

Year.	Over 10,000 tons.		Total.	
	Number.	Gross tonnage.	Number.	Gross tonnage.
1912	.....	.....	168	48,155
1913	.....	.....	115	51,525
1914	3	33,629	79	82,870
1915	.....	.....	63	51,432
1916	.....	.....	94	144,024
1917	.....	.....	244	363,820

SAILING SHIPS.

Year.	Above 20 tons and below 100 tons.		Above 100 tons and below 500 tons.		Above 500 tons and below 1,000 tons.	
	Number.	Gross tonnage.	Number.	Gross tonnage.	Number.	Gross tonnage.
1912	295	13,608	77	10,291	.....	.....
1913	507	22,952	152	20,646	.....	.....
1914	455	20,964	102	13,564	.....	.....
1915	347	17,124	64	8,900	.....	.....
1916	329	17,162	190	22,669	.....	.....
1917	828	43,681	523	80,734	2	1,233

Year.	Above 1,000 tons.		Total.	
	Number.	Gross tonnage.	Number.	Gross tonnage.
1912	.....	.....	372	23,899
1913	.....	.....	659	43,598
1914	.....	.....	557	34,428
1915	.....	.....	411	26,024
1916	.....	.....	519	45,831
1917	1	1,025	1,354	126,773

As is shown in the foregoing tables, by the end of 1917 the Japanese shipbuilders had increased the output of steamships alone by almost 320 per cent as compared with prewar times—an index of remarkable activity. But at the beginning of 1918 the shipbuilders were rather inclined to be pessimistic, because of the scarcity of ma-

terials. As a matter of fact, however, the output of steamships during the year amounted to 600,000 tons or more, including the vessels below 1,000 tons gross. According to the following table, giving the output of different yards, 158 vessels over 1,000 tons gross, all totaling 445,592 tons, were launched between January and November, 1918.

Name of shipyard.	Number of vessels.	Gross tonnage.	Name of shipyard.	Number of vessels.	Gross tonnage.
Osaka Iron Works	20	95,882	Ishikawajima Shipyard	8	17,839
Mitsubishi Shipyard	11	44,700	Fujinagata Shipyard	6	11,900
Asano Shipyard	5	27,226	Kibi Shipyard	7	8,888
Harima Shipyard	7	17,817	Toba Shipyard	4	6,520
Osaka Shipyard	7	9,900	Nitta Shipyard	4	5,530
Mitsui Shipyard	6	8,472	Hakkodate Dock	4	5,037
Yokohama Dock	3	5,918	Aizawa Shipyard	4	5,825
Matsue Iron Works	3	5,443	Uchida Shipyard	3	3,668
Osaka Foundry	4	5,034	Kwansai Shipyard	2	2,700
Chitose Shipyard	3	3,700	Harada Shipyard	2	2,400
Bingo Dock	1	3,000	Kyushu Shipyard	2	2,250
Ohashi Shipyard	2	2,600	Toyo Shipyard	2	2,193
Matsuda Shipyard	2	2,300	Sekimoto Shipyard	1	1,265
Asahi Shipyard	1	2,200	Tochigi Shipyard	1	1,200
Hashimoto Shipyard	1	1,800	Kidzugawa Shipyard	1	1,200
Sano Trading Co	1	1,400	Fukagawa Shipyard	1	1,000
Kawasaki Shipyard	14	77,700			
Uraga Dock	9	43,804	Total	158	445,592

The above gives the present state of development of Japan's shipbuilding industry, but proceeding further and estimating the construction in 1919, we find that a great many of the smaller shipyards suspended operations as a result of the armistice. With the decreased number of yards, the construction in the remaining yards must of necessity be large. Again, with the large stocks of materials on hand, there will be a tendency to produce more ships to get rid of the steel. The forecast of the Marine Bureau of the Department of Communications calculates the tonnage of vessels above 1,000 tons to be launched in 1919 as about 630,000 tons. Estimating the vessels under 1,000 tons as equal to those of the previous year, as given above, at about 70,000 tons, the total comes to 700,000 tons. Calculating the total tonnage of the Japanese merchant marine at the close of 1918, we find a great increase:

Tonnage at close of 1917	1,827,132	
Estimated steamship construction during 1918	515,572	
Estimated steamship construction during 1919	700,000	
Total		3,042,724
Ships supplied during 1918 under the first ships-for-steel agreement	126,150	
Ships supplied during 1919 under the second ships-for-steel agreement	161,500	
Estimated loss of ships at sea during 1918 and 1919	140,000	
Total		427,650
Difference		2,615,074

Thus, at the close of 1919 the total tonnage of steamships constructed and planned amounts to about 2,615,000 tons. As compared with the prewar (1914) figures, this shows a great increase of 1,038,000 tons in the Japanese merchant marine.

Japan's Shipbuilding Capacity.

Before the war the number of shipbuilding ways in Japan capable of constructing vessels of more than 1,000 tons did not exceed 30 in the whole country. After the war began, however, the number of ways increased rapidly and at the end of January, 1918, according to the investigations of Department of Communications, it was estimated that the total reached 119. The following table gives the yards with ways capable of building vessels of over 1,000 tons in all parts of Japan at the present time.

Name of yard.	Length of ways over all.	Number of ways.	Shipbuilding capacity (tons).
Mitsubishi Shipyard (Nagasaki)	767	1	10,000
	605	1	8,000
	602	1	8,000
	540	1	8,000
	430	1	6,000
Kawasaki Shipyard	510	2	7,500
	580	1	7,500
	570	1	7,500
	402	1	10,000
	780	2	10,000
Asano Shipyard	550	6	8,000
Osaka Iron Works	506	2	6,500
	560	2	10,000
	525	1	10,000
	440	1	6,500
	373	1	4,000
Ono Iron Works	280	2	2,500
	330	1	3,500
	200	1	1,000
Kidzugawa Shipyard	320	1	3,200
	300	1	3,000
Kobe Steel Works	355	1	1,500
	390	2	4,000
Harima Shipyard	315	1	3,000
	400	2	7,500
Okinoura Shipyard	200	1	1,200
Hakkodate Dock	235	3	2,000
Fukagawa Shipyard	100	2	1,000
	160	1	1,200
Matsuo Iron Works	360	1	3,500
	400	1	3,500
Niigata Iron Works	180	1	1,600
Imamura Shipyard	282	3	2,000
Ohashi Shipyard	230	3	1,500
Kawamura Shipyard	294	1	1,600
	326	1	2,700
	276	1	1,500
Ishikawajima Shipyard	300	2	3,200
Uno Shipyard	250	1	1,500
	200	1	1,500
	160	1	1,000
Yokohoma Dock	328	1	3,000
	336	1	3,500
Yokohoma Iron Works	350	1	1,200
	320	1	3,500
Uraga Dock	405	3	5,000
	404	2	7,500
Toba Dock	400	1	3,000
	350	1	3,000
Nitta Shipyard	230	3	1,500
Osaka Iron Works (Innashima)	560	3	10,000
	425	3	5,000
Miyagiya Shipyard	230	2	1,750
	256	2	1,750
Asahi Shipyard	400	2	2,200
	450	1	3,000
Chitose Shipyard	240	4	2,000
Sano Trading	250	3	2,000
Kwansai Shipyard	300	4	2,000
Kibi Shipyard	300	2	3,000
Taisho Steamship	200	3	1,500
Masuda Shipyard	210	2	1,000
Fujinata Shipyard	272	2	2,200
Narada Iron Works	260	1	2,200
Osaka Foundry	350	2	1,500
Mitsubishi Shipyard (Kobe)	510	2	6,000
Marudono Shipyard	250	1	1,600
Tochigi Shipyard	270	2	1,500

Total number of ways, 119.

As a result of the sudden expansion of the industry there was a great scarcity of both skilled and unskilled workmen. The skilled workmen, however, naturally distributed themselves among all of the yards, while the deficit was filled with unskilled workmen. In this way the industry was able to fill the ranks of the workmen together with the growth of the yards, and although both the skilled and the unskilled workmen who filled the ranks had their faults, they in-

creased the productive power greatly, and if the supply of raw material had been ample they would have been able to build at least 1,000,000 tons per year.

Future of Japan's Shipbuilding Industry.

As our shipbuilding industry showed this sudden and unusual prosperity, a reactionary depression could not be avoided, and with the armistice, as was to be expected, the industry entered a period of dullness. The prosperity of the ship-construction industry is controlled by the ups and downs of the marine transportation world, and their relationship must first be taken into consideration when reviewing the situation. According to those who know, 25,000,000 tons of space will be required to bring back the 3,000,000 men or more (who, together with their equipment, take 7 tons per man) whom the United States sent to Europe. About 2,000,000 tons of shipping will be used for one year exclusively for this purpose. Moreover, when the problem of transporting the foodstuffs which are necessary for the relief of the people of the belligerent countries of Europe is taken into consideration, it will be seen that the demand for bottoms will not decrease, particularly with the world-wide scarcity of vessels, which, as has already been explained, amounts to 5,800,000 tons. Therefore there is no reason for our shipping world to anticipate a period of depression or a decrease in orders for new vessels.

Future Supply of Shipbuilding Materials.

As our shipbuilders in the past were cut off for a time from their supply of English and American steel, they awoke to the need for the self-supply of steel. By encouraging the establishment of new steel foundries and the extension of the present ironworks at Yawata we could obtain in the future an independent supply of shipbuilding steel, but that will, of course, take some years. Again, it is a question if after the conclusion of peace England and America will remove the restrictions on the export of steel, and if so whether our shipbuilders will avoid further trouble. If after the conclusion of the armistice the export restrictions are gradually relaxed and eventually taken off entirely, these steel imports will still have to bear the burden of freights and import duties.

Again, there is the necessity of imposing certain protective tariffs to make certain the continued existence of those steel industries which have sprung up in Japan of late. As a result, the price of steel produced at home will be high compared with prices abroad. At any rate it will be necessary to use high-priced raw material from abroad. As a result while our shipbuilders may be able to compete with shipbuilders in other countries on an equal footing as far as technique and other points are concerned, it is a question, considering the prob-

lem of raw materials, whether we may expect any great activity in the future or not. I do not see any necessity for any undue pessimism in regard to the future of our shipbuilding industry, but it can be readily seen that the conditions do not permit of any great optimism.

Our Freight Rates in the Future.

In the future the problem to which we should pay the most attention is that of freight rates. The fall in ocean freights since the armistice is unprecedented. Charter rates, in particular, have fallen to a fifth of the highest rates at the end of last year, and as yet it can not be said whether they have touched bottom or not. This condition is being created only because Great Britain and the United States are planning, as one of the postwar state policies, the world-wide lowering of ocean freights. For what purpose are England and America exerting all their efforts to lower ocean freights? Because they expect in this way to obtain control of the seas on all the different routes. As the freight rates have suddenly fallen, of course, it is difficult for our ships, with their high cost, to make a profit, and it is not likely that even British and American vessels can pay a profit. But at the present time, with a decrease of over 5,000,000 tons in the world's shipping, it is doubtful whether these low rates can be maintained for any length of time.

Year.	Freight rates on the Moji-Yokohama route.	Charter rates.		Price of vessels.	
		Large.	Small.	Large.	Small.
	Yen.	*Yen.*	*Yen.*	*Yen.*	*Yen.*
1914	0.76	1.90	.....	.....	.....
1915	1.33	5.60	3.90	125.00	.....
1916	2.66	15.80	9.90	400.00	200.00
1917	7.60	28.00	15.00	800.00	600.00
1918	9.08	40.00	23.00	750.00	900.00
1919 (February)	3.50	10.00	6.00	250.00	.....

Our Shipping Subsidy Policy.

The present depression in the Japanese shipping world is only a temporary condition and is nothing to be pessimistic about. Without going into the details of the shipping business, it can be readily seen that it is becoming more and more imperative that a policy of State aid for shipping be formulated for the future. The following points are considered being the most important:

1. Revision and Restoration of the Old Ship Subsidy Law.

The present overseas navigation law, which was enacted in 1919 and which took the place of the shipping subsidy law before in force, of course was planned for the purpose of developing regular lines on those routes which were the most important for extending the foreign trade of Japan. But with the passing of time, these routes can all pay a suitable profit. The shipping companies which

undertook the routes, even though they should not receive the subsidies, can proceed with the development of the routes without trouble under independent management. At present it would appear that the subsidies are granted with the purpose of restricting freight rates on the subsidized routes, but this is only a temporary phenomenon and was not the original purpose of the law. If, in the future, the regular liners which have been maintaining these runs should find cargo scarce because of adverse economic conditions, or if they should be threatened with the danger of being forced off the run because of the pressure of competition from foreign steamship companies, and if it should be recognized that it would be expedient to continue the line, the present law would be suitable for the purpose of rendering aid and continuing the service. However, if this law should be continued for some time in the future, it should be recognized as just that the vessels outside of the regularly subsidized companies, which have also opened regular lines, should be given the same aid as the subsidies granted in the cases mentioned above. If the present fixed route subsidies should be abolished and amendment made to the old shipping subsidy law which would equalize the advantages among all the shipping men, including the tramp lines, and this revised law should be put into force again, I believe that it would open a way of maintaining an adequate supply of vessels in peace times.

(Translator's Note.—The old subsidy law referred to, which it is desired to have amended and again put into force, provided two kinds of subsidies: (1) A fixed subsidy granted to vessels undertaking certain specified routes, and (2) a general subsidy open to all steamships operating in conformity with the law. The subsidies granted varied with the size, type, and age of the vessel, and it was found that the steamship companies preferred to operate their vessels on a fixed route with a fixed subsidy, thus obtaining a definite income, irrespective of the age or condition of their vessels. Consequently in 1909 a new law was promulgated, granting subsidies on five routes—to Europe, North America, South America, Australia, and Java—while the old general subsidy open to all Japanese steamships was abolished. This confined the subsidies granted to those companies undertaking the five specified routes, leaving the tramp and "outside steamers" without Government aid. It is this condition which it is proposed to rectify by the amendment and reinforcement of the old law.)

2. Extension of the Time Limit of the Shipbuilding Bounty Law.

The fact that the shipbuilding industry is essential to the existence of the country has been made manifest by recent events, and it is unnecessary to state that it is the natural duty of the nation to

maintain and develop this industry. Further, we should look to Government aid as the firm foundation of a permanent expansion. In fact, the existence of our shipbuilding industry to-day is a boon conferred on us by the Government's protective policy. Unless the industry, which is to-day in difficulties in regard to its supply of steel, receives governmental aid, it is certain that it can not compete with shipbuilders of other countries and that its very existence will be imperiled. Not only has the granting of shipbuilding bounties in Japan been suspended during the war, but frequent rumors are quoted of the abolishment throughout the world of the institution of shipbuilding bounties. The recent prosperity of our shipbuilding industry, however, is very evidently a temporary condition caused by the influences of the world war, and the giving up of the granting of bounties, which is the very foundation of the present state of the industry, and the abolition of the entire institution can not be said to be just. Rather, as a postwar policy, the bounties should be reestablished immediately and the period of the existence of the bounty law should be extended for a considerable time, in order to assist the shipowners and shipbuilders.

3. The Establishment of Financial Institutions for the Shipbuilders.

Up to the present the shipowners, in order to obtain working capital, have been obliged to use the vessels which they possessed as security. The loans, however, which were made on ship mortgages were seen to be dangerous and the ordinary banks refused to grant them. Such loans could only be obtained from a minority of the marine insurance companies and from a few individuals who had special connections with the shipping world, as well as the banks controlled by them. The loans, moreover, were generally made under conditions of interest rates, time limits, etc., which were extremely disadvantageous to the borrowers. The supply of capital was not at all abundant, and particularly at a time such as came recently, when shipping struck a period of depression, the flow of money was completely cut off, thus obstructing the development of our merchant marine.

If it is desired to promote a vigorous development of the Japanese merchant marine after the war, it will be necessary to establish an especial financial organ, with the principal purpose of facilitating the circulation of money in the marine world and the supply of capital to ship owners and builders.

4. The Standardization of Ship's Parts and Quantity Production.

The standardization of parts of vessels is highly important to the development of shipbuilding, and in order to facilitate an abundant supply of these parts, the shapes and measurements should be standardized as far as possible and their production in quantity lots should be encouraged by a protective policy.

(Translator's Notes.—In connection with the above the following data regarding the amounts of the navigation subsidies and shipbuilding bounties may be of interest:)

Five-year subsidy contracts for overseas lines approved by the Diet in May, 1915.

Fiscal year.	Europe.	North America.	South America.	Australia.
	Yen.	*Yen.*	*Yen.*	*Yen.*
1915–16	1,832,806	2,924,777	303,906	183,206
1916–17	1,811,910	2,949,012	297,558	173,808
1917–18	1,754,196	2,802,119	291,211	160,253
1918–19	1,689,805	2,669,925	284,863	169,740
1919–20	1,596,272	2,509,187	269,350	188,494

In addition, yearly subsidies are granted on numerous coasting and near-sea routes, such as Kobe, Java, Keelung-Singapore, Kobe-Dairen, Kobe-Shanghai, Tsuruga-Vladivostok, etc.

The subsidies listed above are received by the Nippon Yusen Kaisha, Osaka Shosen Kaisha, Toyo Kisen Kaisha, Nisshin Kisen Kaisha, and Nanyo Kisen Kaisha.

The shipbuilding bounty law, referred to in the above translation, was put into force in January, 1910, and suspended on July 24, 1917, for the period of the war. It divides vessels constructed into two classes and four grades. Class A is comprised of vessels possessing not less than 50 first and second class berths (i. e., passenger vessels) and class B of all other vessels. The grades are as follows: First, ocean-going vessels; second, near-sea vessels; third, coasting vessels; fourth-smooth-water vessels. The bounties are as follows:

	Class A (per ton).	Class B (per ton).		Class A (per ton).	Class B (per ton).
	Yen.	*Yen.*		*Yen.*	*Yen.*
First grade	22	19	Third grade	19	16
Second grade	21	18	Fourth grade	14	11

The shipbuilding bounties granted—1912–1916, inclusive—were as follows:

	Yen.
1912	673,344
1913	973,884
1914	[1] 1,630,000
1915	[1] 1,562,000
1916	[1] 3,122,000

The following estimates of the cost of operation of a Japanese steamship may be of interest in this connection. This estimate was made by a member of a local shipping concern for the United States Shipping Board, and is being used here with his permission.

[1] Estimated.

Roughly the total cost of operation of a tramp steamer will include the following items:

1. Depreciation.
2. Interest on investment.
3. Marine insurance.
4. Repairs and maintenance.
5. Wages, bonus, and provisions of the crew.
6. Stores and supplies.
7. Bunker.
8. Loading, discharging, and sundry.
9. General administration charges.

I observe that of these nine items there is only one which is peculiar to the Japanese shipping, the other items are universal. That is to say, item 5, "Wages, bonus, and provisions of the crew," is considerably lower in Japan than in either Great Britain or America.

The other items of cost, I presume, will be about the same all over the world. The first three items, (1) depreciation, (2) interest on investment, (3) marine insurance, will depend upon the initial cost of construction and the rates decided upon. Japanese shipowners are, I believe, rather at a disadvantage, with reference to these three items, when compared with, say, the British. I have noticed that some of the Japanese owners are figuring as high as 10 per cent for the interest charge alone, while the American owners, according to their own statement, figure on the average only 15 per cent for all of these three items combined.

The bunker charge is another large item, but this cost is practically the same for the steamers of all nationalities visiting a series of foreign ports.

I, therefore, consider it advisable for me to offer you Japanese figures for item 5 only. These figures apply to a Japanese tramp steamer of 8,840 d. w. t.:

	Monthly salaries of officers.	Provisions.
Master	$90	$13
Chief engineer	80	13
Chief mate	55	13
First engineer	50	10
Second mate	43	10
Second engineer	35	10
Third mate	28	10
Total	381	79

The aggregate of salaries, bonuses, and provisions for the master, mates, and engineers will remain about constant irrespective of size of the ships as long as they are ocean-going.

Seamen and firemen get on an average about $10 per month, and about $7.50 monthly is required for provisions.

A steamer of 8,840 dead-weight tons has a total crew of 50 men. Deducting from this the total number of officers, seven, we have 43 left for the number of seamen and firemen. This means that the total wages paid to seamen and firemen is $430 per month, and that it takes $323 for their provisions.

The total cost for item 5, therefore, is as follows:

Salaries of officers	$381
Provisions for officers	79
Wages for seamen and firemen	430
Provisions for seamen and firemen	323
Total cost of item 5	1,213

A bonus, or additional wages, is given as well as the regular wages and the allowances for provisions when the ship sails to distant destinations—the greater the distance the higher the percentage of such extra wage is given—for instance, 50 per cent increase for wages and provisions for ships visiting ports on the Pacific coast of America, 30 per cent to Singapore and Java, 50 per cent to Indian ports, 150 per cent to Mediterranean ports, 170 per cent to Atlantic ports, etc.

If we are to figure cost of item 5 per month of the designated steamer for the trans-Pacific voyage, we must add 50 per cent to $1,213, which will give us $1,820. This will amount to $21,840 per annum.

It will cost probably about $50,000 per annum more than this to man an American ship of similar size. This certainly represents a considerable difference. The cost to man the American ship is three to four times the Japanese cost, but I am afraid that this factor is overemphasized, especially by your marine students.

As a matter of fact, the wage item is a factor of minor importance when considering the total cost of operation. My impression is that in the American shipping this item is about 10 to 15 per cent of the total cost of operation.

If the initial cost of construction is, say, 10 per cent higher in Japan (we have to import raw materials over great distances, and the rates charged by us for depreciation, interest, and insurance are slightly higher, which is likely because of the higher rate of interest ruling in Japan) the advantage due to the lower wages will be completely wiped out.

HOW THE UNITED STATES WILL INTERVENE IN MEXICO.

Source: Translation from "A. B. C.", Mexico City.

26 July, 1919.

(11950.)

The local press is beginning to consider seriously the possibility of intervention by the United States in our domestic affairs. Such a step is no longer considered as the mere fancy of *American Yellow Journalism*, but is being appreciated at its true worth, since it is being fully debated in the American Congress. We do not share the views of certain skeptics that intervention is inevitable. The statement of Ambassador Fletcher, favorable to the Mexican Government, may perhaps force the United States to extend for a while the policy of " watchful waiting," or possibly stimulate our Government, realizing that it is a matter of life and death for it and, what is more important, for the nation to change its policy. However this may be, the threat of intervention is at our doors. The murder of another American citizen (and it is not at all unlikely that this will happen) will be sufficient to set off the train of sentimental patriotism, and with it will come an energetic demand for intervention in Mexico. The present relation of the United States to Mexico is almost the same as that existing before the war between the United States and Germany. The United States entered the war, taking as a pretext the sinking of

their ships by German submarines, and they will intervene in Mexico on the pretext of the murder of Americans.

And until intervention takes place or not, we deem it our patriotic duty as newspapermen to engage in a few conjectures as to how intervention will come and the results that will flow from it.

Forms of Intervention.

President Wilson, impelled by the active forces of the United States to intervene in the internal affairs of Mexico, would be faced by an " embarras de choix " as to the method to be chosen.

The United States might intervene:

1. By complete invasion.
2. By partial invasion (seizure of frontier ports and customs houses).
3. Aiding or recognizing some rebel group.
4. Naming a group of distinguished Mexicans and assisting them in the formation of a government.
5. Withdrawing recognition from the present Government.
6. Presenting an ultimatum to the Government requiring that it shall accept certain demands.
7. Acting as arbiter between the contending Mexican factions.

Before applying any of these methods it is necessary to determine the purpose of the United States in intervening. Do they desire the fall of Carranza? A definite protectorate over Mexico? The annexation of certain portions of territory? The pacification of the Republic, leaving us, as in Cuba, saddled with a Platt amendment: Simply a punitive expedition through Mexico against bandits? Or only the restoration of order " in behalf of humanity "?

Mexico To-day.

Before examining the forms of intervention one by one, we will glance at the present state of our society in relation to intervention.

The prolonged civil war in which our people has been sunk now for more than eight years, the deep divisions existing between all Mexicans, the lack of hope for a political and social regeneration, the physical and moral bankruptcy of the nation, the total disappearance of the cult of heroes, the lack of an eminently religious spirit, the slight confidence or lack of confidence in public officials, the absence of justice, the almost complete lack of respect for private property, and the lack of vested interests unfortunately has brought the result that no less than 8 per cent of the inhabitants of the Republic look at intervention with indifference.

Perhaps upon reading this some Chauvinists will call us unpatriotic, but this is the truth supported by practical proof. The Americans captured the port of Vera Cruz and overran the whole

State of Chihuahua in a warlike way—in the face of the indifference of the Mexican nation.

But there is something graver still which must be stated with all civic valor. Ninety per cent of our educated class which has come to the conclusion that there is no salvation for Mexico except through foreign influence would look at intervention, sad to say, almost with pleasure. Our present moral state is far from that of heroic Belgium or of patriotic France, which gave the blood of their intellectuals to save national sovereignty.

There is no doubt that many patriots will sacrifice their lives; the anti-American will be stimulated; we shall go to war, but with the conviction that our sacrifice will be wholly in vain. Such is the Mexico of to-day of which Luis Cabrera speaks.

Complete Invasion.

This would be most dangerous, the most costly, and the longest. For this task the United States would need to mobilize at least 1,000,000 men if their intention were to control more than the ground they occupy. Complete invasion would create a true state of war, and it is possible that the shameful apathy of our lower classes might be converted into open hostility against the American forces, for every invading army is, by the very nature of things, prone to looting, sacking, and abusing. Its discipline and high civilization would not prevent these acts; the invading soldier, adventurous in spirit and conscious of his power, can not help seizing the opportunity to violate the law and morals and even to infringe the most rigid precepts of military discipline. We shall never be, in the eyes of Americans, anything more than "barbarians," who must be treated as such. Such conduct on the part of the Yankee soldiers would engender hatred in the hearts of the Mexican people, and what might have been a peaceful conquest would be converted into a war of extermination.

Such a course, however, would have certain advantages for the United States. Victorious in the long run, thanks to their power, they would be in a position to annex another great slice of Mexican territory.

Partial Invasion.

This form of intervention is certainly not new to us. The seizure of Vera Cruz by American troops may be said to have been a powerful lever (in addition, of course, to the victories of the revolution, the corruption, etc.) to overthrow the Huerta Government.

Were the United States to seize the ports and border customs-houses without advancing into the Republic, this mere fact would considerably weaken the Carranza Government, the rebellion would spread, many of the constitutionalists would be disheartened, and Carranza and his system would topple like a pack of cards.

What would happen then? The rebel groups, each acting in its own district, would plunge the Republic into a stage of wholesale anarchy, which would compel a union of the various factions on the instinct of self-preservation. Meanwhile the United States by seizing our customhouses would bring us face to face with famine. Under these conditions the United States might have an excuse to save us "for humanity's sake."

Recognition of Rebel Groups.

Since there is no unity among the several rebel factions, the selection of the one to afford the greatest guaranty in the eyes of Wilson would present a serious problem. Furthermore, if only one group were recognized, the state of rebellion would remain latent. On the other hand, the United States no longer has any faith in any of the revolutionary groups. In this respect, their views coincide with those of the vast majority of the Mexicans.

There is no doubt that the group having the full protection and support of the United States will have the greatest probability of success; and this group would be joined, as if by magic, by all the others and even by several factions of the constitutionalists, since everyone is familiar with the popular saying of "climbing on the band wagon."

Appointment of a Group of Distinguished Mexicans.

There might perhaps be found among the so-called reactionaries, condemned to ostracism abroad, some who in their despair to return home might accept a mandate from the United States to form a committee charged with giving a civil government to Mexico with the support, of course, of Yankee bayonets. That there exist among these expatriots several men well qualified for the work can not be doubted. But would they accept the task which would place them in the already long list of traitors? It would all be a matter of form; the eternal question of "saving the country" has been the cause of some of the worst acts recorded in history. Under this formula the greatest abuses have been committed. Maximilian was brought to "save the country," and Huerta committed murder "to save the country." The country has always been taken as an accomplice in furthering criminal relations.

Withdrawal of Recognition of Present Government.

This would be tantamount to the recognition of the rebels. The Government, isolated in its relations with all the world (the other allied countries would immediately follow suit) and abandoned by its own partisans, would be compelled to relinquish the reins of government through the mere form of circumstances. But who would take its place? The problem, so far as the United States is concerned, would remain unsolved.

The Ultimatum.

The United States might send an ultimatum to the Mexican Government demanding that it comply with certain conditions. And if it did yield, could it carry out its promises? It would be a difficult task in view of the chaotic conditions prevailing. The present Government is unable to give any pledges of such a nature.

The United States as Arbiter.

The last method of intervention by the United States would be for it to act as arbiter in settling the various political differences existing in the Mexican cabinet. From such action there might spring an eminently national Government formed by representatives of all the political factions. But this would not be accepted by the Mexican Government, which, believing itself to be the strongest, most stable, and having the best apparent title to legality, would deem it beneath its dignity to enter into any negotiations with its enemies. Besides, since the Mexican revolution began, the United States has attempted on two occasions to act as arbiter in settling our affairs, and on each occasion their efforts have met with the most dismal failure.

Intervention is Intervention.

Whatever be the form employed by the United States in intervening in Mexico, once a decision so to act has been reached there can be no doubt that our sovereignty would be impaired. In the same way, whatever be the resistance offered, we shall be inevitably defeated by the Colossus, now better prepared than ever for the task. And we shall not even be able, as formerly, to resort to guerilla warfare, for it would be broken up by squadrons of aeroplanes.

How, then, can we save ourselves from intervention? By sacrificing ourselves on behalf of the country; by sacrificing power, ambitions, amour propre; by respecting the laws; by handling public moneys with unquestionable integrity; by sinking all partisan passions; and, lastly, by making an appeal to the whole Nation to rally round the same flag, free from bitterness to the past and from fears as to the future.

Is it already too late?

GERMANY'S FINANCIAL PROGRAM.

Source: Reliable.

21 July, 1919.

(11161.)

The ratification of the peace treaty by Germany occurred more rapidly than had originally been anticipated. After the Federal Council had agreed to it, the first task of the new Minister of Foreign Affairs was to prepare for, and carry out the act of ratification

in the National Assembly, an act that could hardly be much more than a formality once the National Assembly had agreed to the peace treaty.

After the ratification of the peace treaty, the moment has come for achieving Germany's political and economic reconstruction. For that purpose a new governmental program is urgently needed. The Government has also announced that it will set forth its program in the National Assembly. Three speeches have been provided for that purpose—the programatic speech of Prime Minister Bauer on domestic policies, that of Foreign Minister Mueller on foreign policies, and, finally, the speech of the Minister of Finance Erzberger. The differences of opinion that had arisen in the new cabinet on the Minister of Trade Wissell's new plan of economic control necessitated the postponement of Bauer's speech. Until it has been made, it will not be entirely clear what the new cabinet thinks should take the place of Wissell's economic system. The speech of the Minister of Finance Erzberger on taxation is known, and his financial program, for the debating of which the National Assembly interrupted the second reading of the national constitution, is to be sketched in general outline in the following.

Erzberger's remarks started from the point of view that ordered finances are the presupposition for the reconstruction of national life, and that a fundamental financial reform is necessary for that purpose. He refused in advance to work for State bankruptcy as a desperate expedient for getting out of Germany's troubled financial situation, because it would be equivalent to national bankruptcy. The German nation just at this time needed credit, much credit with other nations. On that account there can be no question of the annulment of the war loans, in which largely the money of the lower classes is invested. Erzberger also thinks first of their interests in proclaiming justice as the highest aim of the entire tax system and stating that: "Income from capital must bear considerably heavier burdens than income from work." Erzberger regards this as an important act of socialization which had already set in through the increase in wages and the decline in the value of money. As an example he mentioned: "The capitalist who drew an income before the war of 6,000 marks from a capital of 100,000 marks and still has the same income is worse off to-day than a telegraph workman who had an income of 1,500 marks before the war and now draws 7,800 marks pay." The minister used the two words "inheritance tax" and "property tax" to show how this socialization is to be carried through by means of a tax reform, and furthermore held out the prospect of other taxes. It is known now that a large turnover tax is meant first and foremost.

Erzberger's next new point of view for the financial program is that the National Government is to be the "tax sovereign" of the future. That means that the National Government is going to control the three tax creditors of the German subject, i. e., Government, Federal States, and communities, instead of these, as was formerly the case, doing as they wanted or, rather, upholding the special tax privileges as, for instance, the direct taxes for the Federal States. This according national interests preference over all others corresponds to the fundamental principle of the new national constitution.

In this connection Erzberger mentioned some approximate estimates showing that the income of the National Government must be increased 900 per cent; that of the Federal States and communities perhaps 100 per cent. These giant requirements will in future separate into domestic requirements and reparation for foreign countries and will amount to annually approximately 17.5 billion marks for the National Government; about 25 billions for National Government, States, and communities together, as compared with 2 billions of tax receipts for the National Government formerly and 3 billions for the States and communities. It is not yet known what the maximum will be for reparation; that will only be known in four months' time.

If these tremendous requirements are to be filled, the point of view of economy must rule everything, according to the new financial program. On that account (and this was particularly significant at this point of Erzberger's speech) there will be contingent accounts and no war fund after October 1; the war financial system will have to stop and a regular budget system have to commence. That requires the abolition of all unproductive expenditures, in which the Minister of Finances includes unemployment support, which is to be replaced by the provision of remunerative work for the unemployed. That, however, demands new, abundant taxes which were the subject of another speech made by Erzberger. In the latter he stated in general that the National Government had had an income of 2 billion marks from taxation prior to the war. A further 4 billions were added during the war. Then there were the proceeds of the war-profit tax with supplements amounting to 5.7 billions and the war tax of 1918 with 2 billions. The new taxes now prepared are to yield 1,200 million marks. That leaves a sum of 10 billions more to be collected. For that the outstanding single property tax and the big turnover tax enter into consideration without there being hopes of these sufficing. And for that reason the Minister of Finance announced that new tax bills would be introduced in fall. Thus we have a screw without end.

The importance of the planned inheritance tax, which is at bottom nothing other than a final property tax for the testator, lies princi-

pally in its character as a general check for all taxes on income and property. The rates of the inheritance tax which represent the chief burden are graduated according to the closeness of relationship and the size of the individual heritage. To that must be added a supplement for the property already held amounting to from 10 to 50 per cent of the original tax. The tax is graded in such a manner that small and moderate fortunes, particularly in the immediate family, are spared as far as possible. In case the tax can not be covered out of current means on account of its size, provision has been made for meeting it in other manners than through cash payment. This will be done in connection with the arrangements being made for the payment of the big property tax. The connection with the latter is established by reducing the inheritance tax during the first 20 years up to 1940 by 2 per cent for each full year by which the inheritance precedes the latter date. The total revenue of the tax is estimated at something over 700 million marks for the former national territory, of which sum the Federal States are to receive 20 per cent.

Ten new tax bills have been brought before the National Assembly, have passed the first reading, and are now being divided into three groups to be subjected to individual deliberation in three committees. Several more bills that have been included in this grouping in advance are to be placed before the National Assembly in the near future.

The First Tax Commission Is Occupied With—

(*a*) The extraordinary war tax which is to reach the excess income of individuals and the excess profits of companies for 1918.

(*b*) The war tax on capital increment, which is to draw a balance for the entire period of the war and to divert the increment held at its close into the national treasury with up to 100 per cent.

(*c*) The inheritance tax which is to reach the entire estate and, on the side, the individual heritages, including those of children and parents, as well as gifts. This bill will be referred to the committee immediately after its receipt by the National Assembly.

(*d*) The bill for the general property tax, which will demand a contribution from all fortunes without distinction, with the exception of dwarf fortunes up to a rather low limit. The contribution is graded in sharp progression according to the size of the fortune.

This committee will also be entrusted with the consideration of an important bill which will not yield any income but is to reform the German tax system thoroughly, i. e., the national tax regulations. These national tax regulations will make it necessary to provide a complete national income bill, which must be completed so quickly that the income tax for National Government, Federal

States, and communities for 1920 can be carried through on this new, uniform basis.

The Second Tax Commission Will Have to Dispatch—

(*a*) The property transfer tax bill, which is supposed to unify the taxation on property transfer, thus far very diversified, to fix it at 4 per cent, assign half of the proceeds to the Federal States and through them to the communities, leaving it to the judgment of these corporations to levy additional charges up to 2 per cent.

(*b*) The range tax bill, which is to demand a tax of 50 per cent of the surplus value arising through the dismantling of former fortresses and to place half of the proceeds at the disposal of the provincial governments.

(*c*) The amusement tax bill, which is to combine all existing Federal State and community amusement taxes into a national tax and extend them, assigning half of the proceeds to the provincial governments for partial or entire cession to the communities and leaving it to the discretion of the provincial governments or communities to levy additional charges.

As soon as it has been received by the National Assembly also the following tax is to be referred to this commission:

(*d*) The national turnover tax, which the Minister of National Finances intends to raise from 0.5 to 1 per cent and whose section on luxury taxation he intends to extend considerably, both with respect to the articles included therein and the amount of the tax.

The Third Tax Committee Will Be Occupied With—

(*a*) The tobacco tax bill, which desires to introduce the tobacco and cigar banderole with heavily graded progressive rates and to increase considerably the cigarette banderole tax with a heavy progressive development.

(*b*) The tax on matches and lighters for doubling the tax on matches and including lighters in the tax.

(*c*) The playing card tax, which is to amount to 2 marks on ordinary playing cards instead of 30 pfennigs as formerly.

(*d*) The sugar tax, which is to be increased from 14 to 30 marks for 100 kilograms net weight.

GERMANY—MILITARY NOTES—TAXATION.

Source: Weekly Report.

16 August, 1919.

(11544R.)

Military.

Reports of German complicity with the Russian Bolshevists appear to be conclusive. Instructors and war materials are sent forward through Mitau Dinaburg. Train loads of war materials

destined for the Baltic Provinces are still passing the eastern frontier, and recruiting for German units in the Baltic Provinces also continues.

The Polish General Staff have complained that the Germans, in violation of the peace treaty, are removing all Polish Government property from the regions to be evacuated by them and are proceeding to remove the crops.

Measures to Prevent Tax Evasion.

The measures proposed by the German Government to prevent the evasion of taxes and the emigration of German capital are of interest in connection with the fulfillment of the peace treaty. The decrees prohibiting private use of foreign securities and providing for their purchase by the realm are now familiar.

A Federal act of June 4, 1919, against the evasion of taxes is an amendment of an earlier act of July 26, 1918, and provides for an increase of the security to be demanded of taxpayers to as much as 50 per cent of their total fortune. The act further authorizes the Minister of Finance to demand of all banks and savings institutions detailed information concerning all deposits and accounts for the use of the collector of taxes. Penal provisions are provided for failure to furnish full and correct information, which must cover the entire period subsequent to August 1, 1914. The Federal Government is also authorized to conclude arrangements with foreign Governments for the control of mobile property of Germans in foreign countries. The act also obliges all banking institutions in those districts to be ceded or occupied to furnish the tax authorities complete lists of all depositors since October 1, 1918, and to supply the authorities with any further information desired by them in individual cases.

These measures have not proven fully effective; it is estimated that 35 millions of marks have found their way to Switzerland alone. More radical measures are under consideration. It is now proposed to open registers of personal property, which include among other records, entries of all holdings of securities according to their numbers. All numbers not registered would then be declared invalid and the bankers and brokers notified accordingly. It is not believed that foreign securities need be registered in this manner since their number is thought to be small. Should it develop that large holdings of foreign securities have not been surrendered it will be necessary to stamp all such securities and to provide that all foreign securities imported into Germany subsequently must be accompanied by a certificate of importation. All paper money of denominations exceeding 5 marks will be stamped, and unstamped money pronounced invalid. Compulsory registration of all real property and mortgages in the register of real property will go far toward preventing concealment of real estate holdings of taxpayers. There will be close

cooperation between the registration offices and the tax authorities. The control of purchases of jewelry and valuables will be more difficult, but it is proposed to compel all jewelers, art dealers, etc., to register carefully every transaction and to open their books to the tax authorities when desired.

It is generally recognized that these measures will necessitate a huge army of employees, but it is felt that the advantages to the Commonwealth will far outweigh the disadvantages. The Minister of Finance, Erzberger, announces that he will not shrink from brutal measures to prevent the hoarding of money and tax frauds. In a recent interview he said that all securities and coupons would be stamped, and that it was planned to control the entire note circulation. He also threatens financial deserters who fail to register their foreign property with penalties of unprecedented severity. It is now announced that all paper currency will shortly be called in for stamping and replaced with temporary currency. Each holder will be forced to register the amount turned in and will receive only the equivalent in temporary currency. All notes not turned in will be declared invalid.

Financial papers, such as the Frankfurter Zeitung, have taken into consideration the possible injurious effect of the enforcement of the above measures on foreign holders of German securities. In particular a proposal of the majority socialist party to have coupons and dividends on German stocks payable only on presentation of the original securities in Germany has been generally condemned on the ground that it would only act as a deterrent to the investment of foreign capital in Germany.

The Frankfurter Zeitung admits with regret that such radical measures to prevent frauds are necessitated by the low grade of public morals in Germany. Every effort must be made to elevate the "taxation morals" of the people by showing them that the extraordinary demands exacted from them are only the expression of the great impoverishment of the whole country, from which all must suffer. It follows that the burdens must be adjusted with equity, and that the adjustment must level many pronounced inequalities, for no German State which embraces wide social distinctions can exist to-day.

SUBSTITUTE FOR COPPER IN THE GERMAN NAVY DURING THE WAR.

Source: Reliable.

23 July, 1919.

(12039.)

In 1913 the quantity of copper produced from German ores amounted to 25,300 tons, whereas in the same year there were used up in Germany about 200,000 tons. In peace time all that was re-

quired was imported mostly from America, but a short time after the outbreak of the war Germany was compelled to economize her consumption of copper and copper alloys. The capture of Servia with its copper-smelting works at Bor, delivered to the Germans about 14,000 tons in a year, and also at Plakaknitja, in Bulgaria, copper was secured but only in small quantities. During the first and second year of the war the lack of copper from abroad was partly replaced by the conquered stores from Belgium, the north of France and the west of Russia, but the increased consumption of copper, especially by the war needs, already in 1915 amounted to 120,000 tons yearly. This could not be secured and Germany was obliged to apply other means in order to satisfy her demands for copper.

All kinds of tools, and copper utensils, and brass were confiscated. In this respect there was but one copper-smelting work of importance, namely, the Mansfield mine, all the other mines having been adjusted for working off the copper ores which had been imported from abroad, and arranged for refining old metals. The Mansfield Mining Co. proceeded to work over metal which contained only 0.8 per cent copper and reached a monthly production of about 2,400 tons. But also this measure proved inadequate and they were, therefore, compelled to find some substitute for copper.

At the military managing board zinc and aluminum, afterward even iron, substituted brass and copper for tinders and other things, in the latter case i. e., when iron was taken, means were applied to prevent it from getting rusty, besides that only electrolyt-iron was used on account of its softness. From the Giesserei-Zeitung and Metallborre we learn that large factories had been constructed for the production of electrolyt-iron. This electrolyt-iron was mainly used for the making of larger projectiles, whereas for middle-sized zinc was mostly used.

The Goldschmidt foundry at Hamburg succeeded in finding out a sort of iron-bronze (Hammonia) which is well malleable at red and dark-red heat and which can be cast compactly. This metal is a compounding of 57 per cent copper, 40 per cent zinc, 1.8 per cent iron, and 0.4 per cent lead.

In order to economize on the copper consumption, the German Navy had introduced a brass casting, containing 55/60 per cent copper, in place of the so-called naval bronze, which contained a high percentage of copper. While in the case of solid castings such as propellers, fittings, etc., the so-called manganese-bronze (a copper-zinc alloy with an addition of manganese, iron and aluminum) could be utilized to advantage, the production of core castings of these alloys encountered great difficulties at the outset on account of the tendency to form foam and become porous in the case of such parts whose walls are of various thickness. To avoid such foam

formation the ingot mold was made so strong that it could receive the metal required for the piece to be cast at one time. The ingot mold is kept close until the oxides contained in molten metal have come to the surface; only then is the metal poured into the casting mold. In order to have the metal enter the form as quietly as possible the * * * (Steiger) are also closed as * * * (Druckkoepfe), and the air is let out only when the form is nearly filled.

For parts that are exposed to friction under high pressure the bronze corrodes easily and on that account gears, valves, etc., could not be made of it. The copper shortage, however, soon forced the German Navy to give up the brass casting and to use steel casting for propellers, torpedo tubes, and armature parts. The difficulties in the use of this substitute material consisted of the danger of being eaten up by rust and salt water as well as in the use of iron in the vicinity of the compass. The utilization of zapon-lac and enamel as protection against rust did not prove successful. Better results were attained with a special kind of leading which was used chiefly for submarines. The steel propellers also involved considerable losses of speed for torpedo boats, amounting to as much as one-half knot after two or three months, and the propellers of the newer submarines and torpedo boats had to be replaced in case they became rust eaten.

In order to avoid the magnetic influence of iron in the vicinity of the compass, copper was replaced with zinc or zinc alloys with aluminum.

In order to economize on copper for the condenser tubes the German Navy took up the use of pressed brass containing 62 per cent copper. These tubes are said to have proved to be superior to those used in peace times containing 98 per cent copper, as tinning proved to be unnecessary. In smaller ships experiments were made with iron, tinned or oxidized * * * (verstickten) condenser tubes, but the final results of these are not yet known. In order to avoid damage to the tin covering or the oxidization * * * (verstickung) the use of the process of rolling in, as is already introduced for air and oil cooling tubes, was advised for tightening condensation in place of the screw-vice socket.

In the case of turbine vanes successful attempts were made to replace the vanes and intermediate parts with iron; the so-called oxidized vanes enter particularly into consideration in this connection. The oxidization is carried out according to a patented process of the Augsburg-Nurenburg Machine Factory in such a manner that the vanes are exposed to a stream of ammonia gas at a fixed temperature; the heated iron parts dissolve the ammonia so that it separates into nitrogen and hydrogen; the nitrogen unites with the iron as nitrog-

enized iron, while the released hydrogen cleanses the vanes superficially of oxide strata by means of reduction.

In closing it may be pointed out that replacing copper for electric wiring on board ship with aluminum or leaden cables was only partially possible, while on land aluminum was successfully introduced as a copper substitute.

The foregoing statements are taken from a treatise by Chief Naval Constructor Schultz.

TANNICS FROM THE VEGETABLE KINGDOM IN GERMANY.

Source: Reliable.

18 July, 1919.

(12013.)

The tannics from the vegetable kingdom form the most important material for the dressing of leather, though the tannics with chromium had with the beginning of the twentieth century a very great development in Germany. The consumption of vegetable tannics was in Germany before the war more than 300,000 tons and was preponderantly covered by import from oversea. In the following table the import of the most important tannics is set forth:

	Kilograms.	Value.
		Marks.
Bark of oak	32,048,300	2,804,000
Bark of conifers	27,389,500	1,780,000
Mimosa, mangroven, malett, and others	43,335,500	6,717,000
Quebracho and other woods	117,080,700	10,136,000
Divi-divi and other materials	6,354,200	1,271,000
Myrobalans	11,709,900	1,756,000
Cnoppers, valonea, and other kinds	17,173,900	3,177,000
Gallnuts	2,313,700	2,459,000
The following extracts are to be added:		
Extract from oak, spruce, and chestnut tree	3,517,300	7,920,000
Extract from quebracho	17,277,500	5,202,000
Extract from gallnuts	54,300	122,000

The loss of these enormous quantities during the war would have brought on a serious crisis in the German leather industry if it had not been for the native tannics of Germany. The Balkans and Asia Minor furnished relatively only small quantities of tannics, especially "Aleppo galls" of the Quercus infectoria and "Valonea" of the Quercus valonea.

It is necessary to mention here that the so-called Kriegsleder Aktiengesellschaft, which had been established in November, 1914, in Germany for the purpose of securing the raw products for the leather industry of Germany, was obliged to assist many German tanneries in making use of the native tannics by publishing instructions which insured the practical utilization of German tannics.

The most important tannic from the vegetable kingdom is the bark of oaks (Quercus pedunculata and Quercus sessiliflora). There are in Germany approximately 440,000 hectars of oak forests,

and one may get from them 880,000 tons bark of oak. The bark contains on an average 10 per cent tannic. Since the bark had been stored in such a way that it could become damaged by rain, moisture, and mould, a new method of cutting bark was found necessary during the war. A practicable steam developer allows the bark to be cut and dried in the forest. This method has also the advantage in that it facilitates the cutting of the bark from older trees.

According to reports in the leather branch journals people differ in their opinions concerning the value of the wood from oaks for preparation of tannic extracts.

The bark of spruce (Picea Excelsa) contains 7 to 8 per cent tannics. Praessler asserts that 220,000 tons bark of spruce can yearly be received in Germany. The best bark is that of trees 40 to 70 years old, and the cutting of bark should take place in the spring or in the early summer.

People in Germany attempted also to utilize the leaves of oak, the brushwood of spruce, and the cones of spruce for the purpose of getting extracts of tannic by extraction. But all these materials contained only little tannic, and the process was too expensive.

The chestnut tree (Castanea Sitiva) is also to be mentioned as raw material for tannics. Its bark contains 11 to 12 per cent tannics, its wood 5 to 10 per cent, and the bark or the wood, after it has been cut in small pieces, is worked up to tannic extracts. Compared with oak, the chestnut tree has the advantage of growing quicker and producing greater quantities. The chestnut tree thrives best in the southwest of Germany. The following trees of Germany may also be used for the production of tannics:

The fir (Abies Alba)—its bark contains 5 per cent tannics, the bark of larch (Larix decidua), 9 to 10 per cent tannics. For glove leather one can also use the bark of several species of willow trees, as Salix viminalis, and Salix purpurca. The tannics of these trees is highly colored and colors also the leather. The bark of alders (Alnus glutinosa) contains 16 to 20 per cent tannics, but has a red dye which colors leather and makes it brittle.

It would be safe to assert that the German demand for tannics could be covered by its own production.

THE PEACE AND THE GERMAN NAVY.

Source: Reliable.

16 July, 1919.

(11286.)

Now that peace has been signed, Capt. Persius writes in the Berliner Tageblatt, very heavy demands are put upon our Navy and Merchant Marine, which demands, according to the foes' will, must be fulfilled within the shortest time possible.

Six months after the coming into force of the peace treaty, our war fleet may not comprise more than 6 armored ships of the *Deutschland* or the *Lotharingen* type, 6 small cruisers, 12 torpedo-boat destroyers, and 12 torpedo boats. The complement of our fleet may not exceed 15,000 men, including officers. All other warships, submarines, lighters, and docks must be delivered up. There are 8 ships of the line, 8 light cruisers, 42 new torpedo-boat destroyers, and 50 new torpedo boats.

Ships under construction must be dismounted. Auxiliary cruisers and auxiliary ships must be disarmed in order to be used as merchant ships.

The ships which are to be delivered up, the writer continues, must be made ready to put to sea by us, while we have also to take care of their transport. Alas! the All-Deutsche press has been making propaganda to impede their transport. They suggested that nobody should tender his services to deliver them up. Such suggestions ought not to be taken seriously; however, they are surely to be regretted.

Those who understand the interest of their country will, after the peace treaty has been ratified by the National Assembly, do everything in order that the conditions imposed upon us by the enemy be fulfilled as accurately as possible.

Our yards will be very busy dismounting the ships that were under construction. This will result in quite a lot of valuable metal, such as nickel, steel, copper, etc., becoming available for the construction of merchant ships. The change in the business in the war yards, which has already been started, must be completed rapidly. All elements must be used for the construction of merchant ships, agricultural machines, etc.

It is some consolation, Persius continues, that, while the army force is to be reduced to 200,000 men within three months, the navy has been granted six months to perform its huge task. The fleet personnel and, before all, the sea officers, engineers, deck officers, and yard employees of all categories shall have to perform a gigantic task in these six months.

With regard to the merchant fleet, we have bound ourselves in the peace treaty to compensate each ton that has been lost, and we are therefore to deliver up to the enemy all our merchant ships of 1,600 tons and more, half of our ships of between 1,000 and 1,600 tons, while one-fourth of our trawlers and other smacks are also to be delivered up.

Furthermore, we have bound ourselves to construct 200,000 tons per year for account of the enemy, this to be done for five years to come. Our Government has proposed to construct 10,000 tons the first year; this would then be increased gradually so that 300,000 tons

would be constructed the last year. However, so far this proposal has met with no response.

But, whatever the conditions may be, they will not exceed our forces, provided our yards be enabled to work; that is to say, provided that, in the first place, our shipbuilding yard laborers get sufficient food. If this condition is fulfilled it will be possible to solve the question of raw materials and all other questions. It will not be difficult for us to construct 200,000 tons every year for foreign account.

In 1913, 500,000 tons were constructed on the German shipbuilding yards. During the war numerous new yards arose, while the old ones were enlarged. Even reckoning with the loss of Dantzig, Flensburg, etc., the output of our yards may be estimated at at least 500,000 tons, the more because numerous laborers will become available now that the universal compulsory service has been done away with.

JAPANESE NAVAL BUILDING PROGRAM.

Source: Reliable.

6 August, 1919.

(7206B.)

Japan is preparing to effectuate the naval program, already announced and known under the name of the "8 and 8" program, viz, a naval force (four divisions) composed of eight battleships and eight battle cruisers not more than eight years old and a reserve squadron (two divisions) of eight units of older type.

Admiral Kato, the Minister of the Navy, has explained how, until 1923, such a program can not be completed, because of the limited capacity of the arsenals (Government and private) and of the limited amount of funds available. Therefore, until 1923, the naval force, composed of units in the conditions of the "8 and 8" program, will be constituted with a maximum of eight battleships and six battle cruisers, as shown below:

Name of ship.	Date ship goes out of service.
Fuso	1923
Yamashiro	1923
Ise	1925
Hiuga	1925
Nagato	(1)
Mutsu	(2)
Kaga	(3)
Tosa	(3)
Battle cruisers:	
Kongo	1921
Higei	1921
Haruna	1922
Kirishima	1922
"A"	(4)
"B"	(4)

[1] Launched in Kure and to be ready October, 1920.
[2] Building in Yokosuka and to be ready in 1921.
[3] To be built in Kobe and Nagasaki and to be ready between 1921 and 1922.
[4] To be built beginning in 1919 and ready in 1923.

Therefore to maintain the conditions of the program it is necessary that, before 1923, also the following construction must be finished:

Two dreadnaughts to substitute for *Fuso* and *Yamashiro* in 1923.

Two battle cruisers ("C" and "D") to substitute for *Kongo* and *Higei* in 1921.

Two battle cruisers to substitute for *Haruna* and *Kirishima* in 1922.

Two battle cruisers to complete the number of eight.

Consequently, during the four years 1919–1923, Japan must build and put in commission 12 large units—4 dreadnaughts and 8 battle cruisers.

Besides these, the following construction has been approved to be allotted in the next eight years:

	Tons.
8 high-speed cruisers, of about	6,000
24 light cruisers	5,000
32 destroyers	1,300
32 destroyers	850
24 submarines	1,500
40 submarines	800
12 special service ships, of about	10,000

As for the approximate cost, we may consider what the Navy Minister has said: "Beginning from this financial year, the annual expenses for the new construction program will amount to about yen 180,000,000, viz:

	Yen.
3 large units, 41,000 tons, at yen 950	116,850,000
1 high-speed cruiser, 6,000 tons, at yen 1,100	6,600,000
3 light cruisers, 5,000 tons, at yen 1,150	17,250,000
4 destroyers, 1,300 tons, at yen 1,500	7,800,000
4 destroyers, 850 tons, at yen 1,500	6,120,000
3 submarines, 1,500 tons, at yen 2,500	11,250,000
5 submarines, 800 tons, at yen 2,500	10,000,000
1½ special ships, 10,000 tons, at yen 200	3,000,000
Total	178,870,000

Finally, the following expenditures have been decided, to be divided in three (?) years:

	Yen.
Improvements in arsenals at Kure and Yokosuka and building a new school for submarines	30,000,000
Aviation school at Kure	15,000,000
Machinery and materials for shipbuilding	63,000,000
Maintainment of fleet and increased wages	70,000,000

It may be assumed that, beginning from this financial year, the total budget will reach the sum of yen 363,200,000 allotted as follows:

	Yen.
New building program (as per above)	178, 870, 000
Improvements to arsenals, etc	15, 000, 000
Maintaining the two new schools	6, 000, 000
Machinery and materials for new shipbuilding	21, 000, 000
Maintaining of the fleet, etc	23, 330, 000
Ordinary expenses	118, 000, 000
Total	363, 200, 000

BRITISH ADMIRALTY MONTHLY ORDER 3213 CONCERNING INSURANCE OF H. M. SHIPS AND VESSELS WHILE UNDER REPAIR.

Source: Reliable.

7 August, 1919.

(11971.)

It has been decided that contractors shall not effect any policy of insurance upon His Majesty's ships and auxiliary vessels in Government service and their machinery while under repair or undergoing alterations and additions, etc., and contractors are accordingly indemnified against all loss or damages which would be covered by the institute clauses for builder's risks, 1917, or those current when a particular job is being executed, in a Lloyd's policy, if the words "except in buildings or workshops but" in the first clause thereof and the clause "warranted free of capture, seizure, arrest, restraint, or detainment and the consequences thereof, or any attempt thereat, piracy excepted, and also from all consequences of hostilities or warlike operations whether before or after declaration of war" are omitted therefrom.

In view of the acceptance by the Admiralty of the risks covered by this indemnity, no premiums for insurance against such risks will be recoverable from the Crown, either by direct charge to the cost of a job, or indirectly as a factor in the calculation of established charges.

All contractors who have signed the emergency repair agreement have been informed to this effect, and any firms which may undertake such work in the future and have not been informed of the new arrangements should have the matter drawn to their notice by the local officers concerned.

LAUNCHING OF A JAPANESE SUBMARINE.

Source: Reliable.

6 August, 1919.

(6452.)

Information has been received that the *No. 18* (a bigger type of submarine), which was constructed at the Kawasaki Dockyard, Kobe, will hold her launching ceremony on the 28th of July. After finish-

ing her equipment about the middle of the coming November she will be brought to Kure.

Her displacement will be about 400 tons on the surface and about 650 tons submerged. She will make about 14 knots on the surface and 8 to 9 submerged. She is of the Italian type—F. I. A. T.—and has an excellent cruising radius of about 4,000 miles. This type is used for coast-defense work and is able to keep station for about 20 days without replenishing fuel.

JAPANESE CRUISER LAUNCHED.

Source: Reliable.

18 July, 1919.

(11967.)

The second-class cruiser *Kuma*, laid down in August, 1918, was launched at the Sasebo Navy Yard on 14 July, 1919. The principal dimensions of the cruiser are reported as follows: Length, 500 feet; beam, 46 feet 9 inches; draft (average), 15 feet 9 inches; displacement, 5,000 tons; armament, 7 six-inch guns, 2 machine guns, 4 torpedo tubes, 3 searchlights; speed, 33 knots.

MILITARY NOTES—GREAT BRITAIN.

Source: Reliable.

19 July, 1919.

(115540.)

There have been more than 200,000 voluntary enlistments in the British Army in the past two months, and the War Office has announced that the entire Army, both at home and abroad, will shortly be placed on a volunteer basis.

The announcement that British troops would shortly be withdrawn from Russia has given general satisfaction and had disarmed the labor element's criticism of the Government.

ITALIAN POLITICS IN AUSTRO-HUNGARY AND THE BALKANS.

Source: Reliable.

24 July, 1919.

(11011A.)

The sudden manifestation of discontent of the Italians toward their Allies, which was aroused through the intermediary of journalists and zealous propagandists by the Italian Government and nationalists, in the midst of a population for the most part indifferent, and the object of which was to consolidate the position of the Orlando ministry, has resulted in revealing the schemes of the Italians in the former Austro-Hungarian Empire and in the Balkans.

While thus far every endeavor has been made to keep these dealings secret, it is a fact that for the past six months the Italians have been displaying extraordinary and very methodical economic and political activities at Vienna, Budapest, Prague, Bucharest, and Sofia. After having bought up a great part of the Austro-Hungarian merchant shipping, they have been buyers for large quantities of shares in shipping companies.

In Roumania and Bulgaria the Italians have entered the banks, industries, and commercial firms. Having almost complete control of the railroad traffic between Trieste and the interior, they have taken advantage of this to introduce into Austria, Hungary, and Czecho-Slovakia considerable quantities of goods either manufactured in or reexported from Italy. For all these supplies, accounts in lires are opened to purchasers, the difficulties caused by present conditions of exchange thus being reduced to a minimum.

From the political standpoint Italy's designs are no less vast. Her principle, her point of departure, is the isolation of the Jugo-Slavs, who are considered as the declared adversaries of Italian expansion. The first care of the Consulta was to negotiate with Hungary.

The communist revolution did not interrupt these negotiations, which were immediately resumed with Bela Kun. Whereas other foreign missions left Budapest, Prince Livio Borghese remained with his personnel, though he was destined for the legation at Belgrade. The Italians correspond between Budapest and Vienna either by ciphered telegrams or by air service, without the communist government raising any objection. The Italian mission at Vienna represents to the Allies that this courtesy has enabled its agents to obtain various information concerning the military forces, contingents, arsenals, and war manufactures of which the Budapest Government disposes, which information, however, the Allies had already obtained through other sources.

In the last offensive directed against Hungary by the Czecho-Slovacs and Roumanians, the Czecho-Slovacs were suddenly checked and obliged to retire in disorder. They considered that they had been betrayed by the Italian staff. Gen. Piccione, who was directly accused, admitted the errors committed but attributed them to "Commandant de Komorn," who had badly executed his orders. It is even said that consignments of arms are being made by the Italians to Hungary. It is said that the Italian Government dispatched guns and munitions to Budapest by Red Cross trains, and which Bela Kun has already paid for in part with 25 millions in gold. Finally, the Italian officers at Budapest are actively engaged in reorganizing the munition factories.

Certain Hungarians see clearly through Italy's schemes. The Austrians forming part of the Government, as also others, are likewise not deceived by these maneuvers. Italy's desire is that there should be only one group of States in Central Europe and in the Balkans; to have, as a result, the encircling of the Jugo-Slavs, and that will subordinate its policy to the needs and suggestions of Italy.

That is why the action exercised at Vienna by the Italian agents appears so often as a negative action or contradictory action. The Allies seek to debar any attachment to Germany; Italy gives it to be understood that she does not make any opposition. The Allies recognize the establishing of customs and commercial agreements between the States issuing from the former monarchy; Italy vigorously opposes this project as if it were a matter of reestablishing the former monarchy on new bases. She well knows, however, that on the one hand it is impossible to reconstitute Austria-Hungary, and on the other hand, that the States that are politically separated can not be prevented from coming to an agreement on the economic terrain and from concluding between each other agreements that are equally indispensable to all.

The dispositions of the Czechs toward the Austrians are each day improving, at least in the sense that Prague perceives more and more clearly the necessity for an economic agreement with Vienna. Concerning the relations with the Jugo-Slavs, they are little affected by military incidents, and will, without doubt, shortly permit of the conclusion of positive arrangements.

The schemes of Italy, therefore, seem to have but small chances of success. The merchants and bankers of Italy may perhaps manage to make some money, but the Consulta will loose its pains. Italy is too short of means, and too docilely follows the exaggerated schemes of Nitti to win the economic combat in which she has engaged. From the standpoint of political enterprise, she is gravely compromised by the mistrust that she arouses in Vienna and in Prague.

ADDRESS OF M. NITTI BEFORE ITALIAN SENATE.

Source: "Le Temps" of 26 July, 1919.

30 July, 1919.

(11033.)

M. Nitti yesterday disclosed to the Senate the difficulties under which Italy is at this time struggling, difficulties which must be, according to him, viewed without vain illusions and likewise without futile recrimination respecting the past.

He expressed himself as follows:

The disorders which in so far as concerns other countries constitute a peril only might involve death for us. Whosoever is guilty of provoking disorders in Italy, either prompted by an exaggerated nationalistic sentiment or by a sentiment of revolt or anarchy, is a corruptor. Internal order is the unique condition necessary for production, since in order to produce it is absolutely essential to possess raw material, and to obtain this order is indispensable. It will be necessary that we be accorded by foreign nations eight or ten thousand millions for the purchase of raw material.

M. Nitti then explained the situation of Italy respecting the Allies, and deplored all untimely attitudes which might be of a nature to injure the good relations of Italy with the Allies. He said:

Our Allies have aided us during the course of the war, but certain of them believe that their obligations have terminated with the war. The United States consider that even private loans can not be accorded to Italy before the political situation is cleared up. [Sensation and comments.] This does not imply hostility, since the United States have loaned us at 3.5 per cent at a time when we were subscribing to our own loan at 5.56 per cent, at the same time believing that we were making a sacrifice.

The United States have accomplished their task; now it is a question of requesting of them a friendly act, and we must ourselves act in a friendly way.

We must in no wise disturb the relations with the countries with whom we have fought. [Very good.] In sacrificing a portion of our sentiment, in repressing our grief, our greatness will be much greater. [Very good.] I hope that a favorable issue will intervene in so far as concerns these difficulties incident to foreign policy. I would add that it should not be said, if one of our national aspirations is not satisfied, that we have lost the war. That would be folly, in that we have won the war, and the dignity acquired by Italy in the world at large is worth to us more than all other riches. [Very good.]

Let us not forget that it is we ourselves who have defeated the ancient Empire. [Very loud applause.] The aid of the Allies, cordial and friendly, arrived at a time when our lads had arrested the enemy's invasion. We held out alone, and this despite the fact of the treaties by which we were not to be alone in combatting the Austro-Hungarian Empire. We were alone and we routed the Empire which had seemed invincible. [Very loud applause.]

No one can say that we have not won the war. We must live with austerity. To the victory won in the war must succeed the victory of peace. We must reduce, through sacrifice, the unnecessary expenses, restore our finances, and demobilize as soon as possible.

M. Nitti declared acceptable the order of the day expressive of confidence presented by Senator Denouvellis.

The other orders of the day being withdrawn, the Senate unanimously approved, by 102 votes, the Denouvellis order of the day. The Senate also approved the rough draft of the emergency appropriations up to 31 December.

ITALY—NOTES ON.

Source: Reliable.

9 August, 1919.

(11714K.)

Size of Italian Army.

On 2 June, 1919, Italy had under arms over 2,000,000 men, the largest standing army in Europe. The principal reason given for nondemobilization of further classes was the want of funds to make the demobilization payments decreed.

A Second League of Nations.

It was reported "on good authority" on 9 June, 1919, that the Italian Government had received proposals from Germany to join in the formation of a second league of nations to include Italy Germany, Japan, and parts of Austria-Hungary and Russia.

The same "good authority" states that German capital, which before the war had such a strong hold in Italy, is being permitted to reorganize as rapidly as possible, with a view to forestalling any similar project on the part of the capitalists of the Entente or the United States.

Another Grievance Against France.

It is reported that Gen. Picone had gone to Prague in the expectation of becoming commander in chief of the Czechoslovak Army, but that under pressure from the French Minister at Prague the French general, Pelle, was chosen instead; whence the withdrawal of the Italian military mission to Czechoslovakia, whence also strong resentment against France in Italian military circles.

[From the New York Times.]

Prime Minister Nitti's fresh disclosures before the Senate to-day on the subject of Italy's actual financial plight have created a very profound impression. Some of the Allied Governments, he said, deem their obligations toward Italy to have terminated with the end of the war. British credit is about to cease, and the United States Treasury has no further obligation of anticipating credit after 31 August, 1919.

The serious aspect of the matter is that the Washington Government thinks that not even a private credit can henceforth be granted to Italy until the political situation is definitely cleared up. On the other hand, Italy can not face the coming 12 months unless she is able to realize foreign credit to the extent of 8,000,000,000 to 10,000,000,000 lire for the purchase of raw materials.

Signor Nitti made an earnest appeal for the stoppage of revolutionary propaganda and of fanatical attacks upon the Allied powers.

" For other nations," he said, " perhaps internal disorders represent merely danger, but for us in Italy they spell death. The plain truth respecting the Allies is that they fulfilled their duties toward us magnanimously during the war. America, for example, lent us money lavishly at 3½ per cent, when to raise loans among ourselves we had to offer 5.56 per cent."

RUSSIAN CONDITIONS.

Source: Reliable.

14 August, 1919.

(11525B.)

An increase of one-half pound daily has been made in the amount of food issued at Petrograd to first and second categories. One-half this amount is granted to the third category. Employees of the Soviet receive twice the amount of the first category. During the last 8 days only 35 cases of cholera have been reported in Petrograd. As a system of piecework has been inaugurated in the factories of Petrograd, their efficiency seems to be improved. For example, in the Ryetchkin works 450 workmen produced, during the last month, 12 railroad cars. A decree has been issued directing a special " week of agitation " and there has been organized a program of propaganda which is elaborate in character. The fact that this policy has been introduced would apparently indicate that an attempt is being made by the Bolsheviks to make an appeal to the people's reason and also to indicate that, at least temporarily, terrorist measures will be diminished.

A statement has been issued by the committee of the central soviet to the effect that the crops in the Volga region are good and that in order to harvest them 70,000 workmen will be needed. Reliance can not be placed on this statement. The tax department has on file statistics which have not been published which report that in Ublestraina there are 345,469 tons of granulated sugar and 62,604 tons of head (raw) sugar.

The commissariat of interior has on file statistics, which have not been published, stating that there are now operating 18 paper factories in the Provinces formerly included in the commune of northern districts, as against 49 factories which formerly were working in those Provinces. An estimate has been made for the next three months of the production of paper at 5,233 tons. This equals 48 per cent of the former capacity. The production of wood pulp is estimated at 3,633 tons. This is equal to 20 per cent of the former capacity. Orders for paper machinery have been placed in Swedenborgian to a larger amount.

A communication issued by the Bolsheviks declares that on the Finnish front the enemy has been cleared from Russian influence.

This communication further declares that on the Murmansk front the red forces have retreated to Prossadwoadks and that on the Esthonian front the soviet troops have advanced to a point within a distance of 37 versts of Pskoff.

A statement has been issued by Commissariat Shotoff that there is no longer any fear of Petrograd being captured and that, on the other hand, the Bolshevik troops will advance, having as their objective Pskoff. He further states that, fearing a red uprising in their rear, the Finn troops will not advance.

Orders have been issued to the soviet troops that for no reason shall they cross into the territory of Finland, but an announcement is made at the same time of a bombardment, which has been carried out by aeroplanes, of the Finns.

RUSSIA—NOTES ON.

Source: Reliable. **9 August, 1919.**

(11714K.)

On 21 July, 1919, the Onega section from Onega City to Chekuevo, which is about 48 miles west of Obozerskaya, went over to the Bolsheviks. This sector was held by the Fifth Russian regiment, which mutinied, raised the red flag, and now holds the district for the Bolsheviks. An attempt at mutiny by several companies of the Sixth Russian Regiment on the Archangel-Vologda Railroad sector also occurred, but was quelled by British and Polish troops, and the mutinous companies were disarmed.

Gen. Ironsides is reported to have wired London for strong reenforcements at once; he advises that, if these be not furnished, the army be withdrawn, for the situation in the district is such that the entire district may become Bolshevik overnight.

Some causes are anti-British feeling amongst the Russians, civil and military, inefficiency of Russian officers, Kolchak's failure, Bolshevik propaganda, and complete American withdrawal, which last has had a very bad effect upon the friendly population.

Persistent rumors are current among local Russians that the British are to withdraw in the near future, in which case local Russians alone will not be able to cope with the Bolshevists. The whole district would pass into Bolshevik control.

Gen. Ironsides recently told me that he expected to have every British soldier out of the Archangel district by 1 November, 1919, whether or not the Kotlas offensive was successful. Owing to Kolchak's failure, this offensive has now been abandoned and our front may be withdrawn toward Archangel. 25 July: "There is some talk of establishing a military dictatorship under Gen. Ironsides."

On 25 July the Esthonians reported that arrival of reenforcements had enabled them to repulse the Bolshevist offensive against Pskof.

Report of 22 July: "The Bolshevists claim the recapture of Konstantinograd (southeast of Poltava). Farther east they are continuing their advance in the Borisogliebsk-Balashof area."

Report of 24 July: "Fighting continues south and west of Ekaterinoslaf and in the Balashof area (between Voronezh and Saratof). The Bolshevists claim to be fighting on the northern bank of the Khoper River.

"Bolshevist cavalry are reported in Ashkabad, on the Trans-Caspian-Persian frontier."

From Vladivostok 25 July: "Kolchak's army continues to retreat all along the front. Rumors are current in Vladivostok of the evacuation of Omsk or the downfall of Kolchak. Although apparently untrue, they gain ready credence in all circles, indicating lack of confidence in Kolchak's government.

"Strike situation improved. The Bolshevists are not offering organized resistance anywhere in eastern Siberia."

FRANCE—POLITICAL SITUATION.

Source: Reliable.

16 August, 1919.

(11554R.)

Political.

The French Parliament after considerable discussion has recognized the fact that no amendment of the peace treaty is possible in France; the President of the Republic negotiates treaties and afterwards Parliament can confirm or reject but not amend them. As a result the Deputies are still somewhat divided in their attitude. The Nationalists favor voting the treaty as quickly as possible and then holding the general elections; others favor awaiting action by the American Senate in order not to lose whatever might be gained by its amendment. While at first view this course would seem more advantageous for France, it is not without a serious and almost insuperable defect—the resulting difficulties for the elections. It these are not held by November it seems probable that the present Parliament will meet in January to elect the next President.

It is not only in relation to the presidential election that the date of ratifying the treaty is important, but also in relation to the next cabinet. Briand has declared categorically that he will not form a cabinet until the treaty has been voted. Viviani, on the other hand, would like to form a cabinet at once.

Meanwhile, the Chamber is in recess; just before adjourning it received with general approval the report of the committee on peace. Clemenceau has now definitely ranged himself on the side of the

Nationalists in desiring a speedy consideration of the treaty, and, as proposed it will be taken up on 26 August and should pass the Chamber in the first days of September. In view of this the parliamentary elections are scheduled for 26 October: the election decree is to be published in the Journal Officiel of 4 October, the day on which demobilization is to be completed. Elections for other bodies will soon follow, finishing with the election for the Senate on 14 December.

The high cost of living continues to absorb public interest. The success of the consumer's league or vigilance committee at Montmarte in keeping prices down led to the formation of similar bodies throughout the great centers in France, but finally resulted in some rather serious rioting which was only quelled by the intervention of the Minister of War. He has asked the vigilance committee to suspend action until it can be seen whether the posting of normal prices would not produce the desired effect without provoking retaliatory measures on the part of the merchants.

A cause of dissatisfaction is the Government's attitude toward the devastated regions. M. Jonnart, who recently resigned his post as governor general of Algeria in order to devote his entire attention to representing his Department in the Senate, has declared that "Bureaucracy must yield and the Government must act." Public belief that the Government has been guilty of neglect since the departure of the Germans has reached such a point that Clemenceau has been forced again to order decided action. Schools are to be opened, prisoners of war to be distributed fairly, fullest powers to be given to the prefects, and funds advanced to communes and individuals. A new office of inspector general of roads and bridges has been created and given to M. Michael, and a bill introduced calling for the construction of two new railroads through the Vosges Mountains.

The retrocession from England to France of the Island of Mauritius, in the Indian Ocean, is receiving some attention in the press.

A most complicated situation has been created by Clemenceau's appointment of the two bishops of Alsace-Lorraine. Cardinal Amette was unofficially sent to Rome to ascertain whether the two French prelates agreeable to M. Clemenceau were well considered by the vatican. The cardinal having brought back an affirmative answer, Clemenceau appointed the two bishops of Metz and Strasburg. The vatican, however, has neither accepted the resignation of the German bishops nor confirmed the French appointees. A double violation of law has been committed by the premier; by negotiating directly with the vatican, he violated the French law of separation between Church and State; by appointing bishops he violated the concordat passed by France between Alsace-Lorraine, and the vati-

can. Millerand, the governor of Alsace-Lorraine, has taken the stand that he can recognize only legally appointed bishops, who happen at the present moment to be German. The council of state has adjourned discussion of the matter in order not to embarrass the Government, and efforts are being made to induce the vatican to accept the resignation of the German incumbents and, without further delay, to sign the bulls appointing the French bishops.

GERMAN ACTIVITIES IN SOVIET RUSSIA.

Source: Reliable.

22 August, 1919.

A report has been received from Moscow announcing that the representatives of a German concern which has been negotiating with the central soviet for the purpose of securing concessions of land in Russia have reached that city. Another report states that certain German interests are negotiating with the central soviet of the Bolshevik government for the purpose of taking part in the reorganization of railroads in that part of Russia under the rule of the soviet. The red army has also obtained as instructors a considerable number of German officers who have been drawn thither by the large offers of pay made by the Bolsheviks. The exact number of these officers is not stated. One of my agents at Petrograd confirms the report that a German staff has been established in that city.

Trotsky, who has visited the southern front, has returned from there. He points out in the report which he has made to the high military consul that it is necessary that efforts of an extraordinary character should be made with a view, before winter, of crushing Deniken. The mobilization of all youths 18 years old is further urged by Trotsky, and he also recommends that every measure be taken with a view to sending to the southern front all former officers.

There are forwarded copies of papers currently issued in Petrograd which reports that in the rear of the southern army of the Bolshevik uprisings have taken place.

A report comes from Orenburg that food is available there for transmission to Moscow amounting to 4,167 tons, and that there are at Ufa 1,667 tons of food which may be available. However, the shipment of this food will be prevented by the disorganization of transportation. The daily receipt at Petrograd of food amounts to about 13 carloads, amounting to 200 tons.

The soviet at Petrograd has received a confidential report from the commissariat of the interior stating that in the Provinces of Tehespovatz and Vologda the milk and butter industry is ruined. With a view to bringing up this industry the soviet has voted an appropriation of 15,000,000 rubles.

ENGINEERING.

RADIO APPARATUS.

Source: Bureau of Standards.

19 August, 1919.

(9802B.)

The development of the electron vacuum tube is rapidly replacing the old-time noisy generators used to produce radio waves, and on account of its many advantages, including the production of continuous waves, which greatly reduce interference, it is in a large measure revolutionizing radio communication. However, the development of such a new device invariably carries with it a great number of technical problems, one of which, in this case, is the determination of the power output and the general behavior of the tubes from the characteristics which are readily subject to measurement. A scientific investigation by the bureau has yielded methods by which this can be done. In the practical use of electron tubes as generators a direct current source of power is required; and as batteries or machines to produce the high and unvarying voltages are not available commercially, the bureau was requested to perfect some means of obtaining the type of current required. This was done by using similar electron tubes as rectifiers, supplied with alternating current. Difficult special investigations were necessary in order to remove some of the difficulties, such as the slight pulsation of the rectified alternating current. The application of this work was principally in the field of radio telephony, in which the relatively feeble waves must be converted, by means of a high-power amplifier, into the very powerful waves required for telephoning long distances. New methods of applying high-power tubes as amplifiers were successfully worked out to meet this need.

Radio Direction Finder.

A study has been made of the errors in the use of the radio direction finder due to the distortion effect of buildings and large natural objects. It was found that nonmetallic objects, such as banks of earth, a brook, a gully, or a tree, do not seriously affect the indications of the direction finder, although they change the apparent direction a few degrees when close by. Metallic objects, however, such as a water-tower, a bridge, a tuned aerial, or a trolley line, cause large errors, changing with the location of the direction finder, and

with the wave length that is being received. This effect is due to the currents produced in such objects by the radio waves, which become large and have a powerful effect on a near-by direction finder when the natural wave length of the object is the same as that of the received wave. Special studies were made in the vicinity of the Washington Monument, the steel elevator shaft of which makes it in effect a metallic tower 550 feet high. Moreover, there are no trees, buildings, or other large objects in the near vicinity. Direction errors as great as 90° were found for wave lengths close to the natural wave length of the Monument, falling off rapidly when the wave lengths were less than one-half or more than twice this value.

Electrolysis.

A peculiar case of corrosion of lead cable sheaths used by a St. Louis power company was investigated, in which it was found that the difficulty was probably due to a combination of several causes, chief of which was the subjection of the cable system during its first few months' use to very high positive potentials. Subsequent failures gradually developed, due particularly to the elevated temperature at which the cables were operated and to the peculiar type of conduit used.

A study is being made of improvements possible in the methods of carrying out the surveys leading up to the work in mitigation of electrolytic corrosion, and particular attention is being given to the methods of measuring the current flowing in pipes and the leakage of current from pipes, to replace the old method of measuring differences in voltage between the metal structures concerned. A number of instruments have been built and have given satisfactory results in laboratory tests; they will be tried out under field conditions during the next few weeks. Because of the contradictory character of the evidence as to the conditions under which corrosion of lead cable sheaths occurs, it has been necessary to carry on a great deal of laboratory work, as, for example, to determine the variation of corrosion with varying current densities in earths, sand, and water. In agreement with previous results, it has been found that the corrosion per unit is greater when the actual current density is small. Experiments have been carried on to simulate the condition which occurs when parts of piping systems are alternately positive and negative so that at times the current flows into and at other times out of the metal. The relative amount of corrosion has been found to decrease very rapidly when the portion of time during which the specimens are positive is decreased, and it appears probable that in such cases some of the metal is actually redeposited on the specimen when the current is reversed, although it has not yet been possible to prove this conclusively.

Electric Battery Investigations.

Particular attention has been given to the study of the manganese ore used in dry cells, a material of which the supply was cut off during the war and which is still difficult to obtain. Through the kindness of a manufacturer, a machine has been obtained for making the dry cell "bobbins" from ores which are analyzed and ground at the bureau, thus permitting the correlation of results obtained in our examination of the materials with the performance of the product turned out by the factory. The results, though incomplete, have already proved to be of considerable importance. Additional work is being done on methods for determining small amounts of nickel, cobalt, iron, aluminum, and silicon, in manganese ores.

In the investigation of storage batteries, particular attention has been recently given to methods of measuring the performance of positive and negative plates. It was found that in some kinds of batteries an excess of capacity existed in one plate, as compared with the other, implying a direct loss of efficiency in the use of material. In connection with these studies, an investigation has been made of the methods of measuring the plate potentials separately, in particular, by use of the cadmium electrode, and a paper on the subject has been prepared. Methods for determining nitrites and nitrates in storage battery acids are also being prepared for publication.

Sometime ago a manual on "The Use and Care of Storage Batteries" was prepared by the Construction Division of the Army, and since that division is not now able to publish the manual, arrangements are being made to issue it as a bureau circular. The bureau has also assisted the War Department Committee on Education and Special Training in preparing the manual on storage batteries for use in the educational work carried on by that committee.

ELECTRIC WELDING.

Source: Reliable.

18 August, 1919.

(9638B.)

In April, 1918, the badly worn shell plating of H. M. S. *Columbella* was reinforced by electric welding. Particulars of this work are given in the paper read before the Institution of Naval Architects on 11 April, 1919, entitled "Some Experiences with Electric Welding in Warships," by Mr. W. H. Gard, Deputy Director of Naval Construction. A sketch showing the area reinforced is given in that paper.

In April, 1919, this vessel was docked and the plating that had been reinforced was thoroughly cleaned and examined. The welding was found to be adhering and in good condition, except in one

small place about 3 inches square, where it was detached and broken. The fact that only a comparatively small area was found to be defective shows the use of electric welding for this purpose is very effective, but the fact that the small portion that was detached when hammered was not adhering in a proper manner shows the necessity for the very best of workmanship and the careful treatment of the parts by cleaning before commencing the welding, and furthermore frequent and careful examination that defects may be discovered before corrosion becomes extensive.

The portion defective in this case, although visually apparently sound, came away in small pieces in much the same manner as thick, hard scale on plating when hammered, and the plating at the back showed signs of black scale. On examination it was found that the plating was badly pitted in places other than those welded by electricity.



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MONTHLY INFORMATION BULLETIN

15 OCTOBER 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 October 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE.
NAVY DEPARTMENT.
Washington, D. C.

MONTHLY INFORMATION BULLETIN.

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DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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MONTHLY INFORMATION BULLETIN.

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FOR CONVENIENCE IN ROUTING.

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Captain			
Executive Officer			
First Lieutenant			
Navigating Officer			
Gunnery Officer			
Communication Officer			
Engineer Officer			
Medical Officer			
Supply Officer			
First Division Officer			
Second Division Officer			
Third Division Officer			
Fourth Division Officer			
Fifth Division Officer			
Marine Officer			

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AVIATION.

AVIATION.

Source: Reliable.

25 August 1919.

Aviation in Future Wars.

At the beginning of the war just ended none of the Governments engaged had an adequate conception of the important rôle that would be played by the aeroplane; none but Germany had given any serious attention to the design of large dirigibles. Appropriations for military and naval aviation had been very small, and there was but little other business to help maintain the feeble aircraft industry. Consequently aircraft and aircraft-motor manufacture was on such a small scale that manufacturing and engineering personnel was not available in sufficient numbers for putting the industry promptly on a quantity production basis. Production was further delayed for the reason that design, particularly in motors, had been along lines that involved much expert handwork in fitting and assembly; furthermore, almost nothing had been done on the question of standardization of alloys, parts, and fittings that could have been common to the various military types.

Although the improvement in aircraft and motor characteristics and performance was very large during the war, it is realized that development was along rather conservative lines; the race for supremacy in the air on the western front was so close that neither side could afford to divert their best engineering talent to experimental work along uncertain lines. On this account there was no designing of a radical nature, either in aircraft or motors, undertaken during the war. Now that there is an interval of peace ahead, there will be time for a more thorough study of the material lessons of the war and opportunity for research and experiment along bolder lines. Also the development of naval aviation in the fleets can now be given the attention it deserves.

Besides being unprepared for industrial expansion in aviation, all nations in the war just ended were unprepared for expansion in

operating personnel. At the beginning of the war there were very few officers and enlisted men trained in military and naval aviation, and the expansion of personnel in these two branches of warfare was proportionately far greater than in any other. For example, at the beginning of the war there was a total of about two hundred (200) British Navy and Army aviation officers; at the end of the war the number of officers in the Royal Air Force was about twenty-seven thousand (27,000). The necessity for providing a large reserve in aviation operating personnel is well appreciated abroad. The manner in which this subject is being taken care of will be indicated later.

In view of the above it is believed abroad that at the beginning of the next war aviation material and personnel in very large numbers will be immediately available, and that the military efficiency of aircraft will be considerably advanced beyond the offensive limits of existing types. Who can estimate the limits in radius of action, speed, and carrying capacity of aircraft at the end of the next 40 years? In general the opinion abroad conforms to the following statement made by Marshal Foch to the head of the aviation mission:

"In the next war the first great battle will be in the air, and, as was clearly demonstrated in the present war, if a nation is to conquer she must have supremacy in the air."

Development of Commercial Aviation.

The aircraft-production troubles of the war just ended have furnished a lesson that is well understood in Great Britain, France, and Italy; namely, that a well-organized aircraft industry must be maintained in times of peace to meet the war time production needs of aviation. It is also realized that during peace an adequate industry can not be supported by Government aircraft orders alone; therefore, commercial aviation must be brought to a condition such that it will be able to carry the greater part of the financial burden of the industry. High command in the armies and navies abroad are giving serious attention to this question, not only because of its vital importance in their aircraft-production problems, but also because of its equally important relation to the question of maintaining an adequate reserve of aviators and mechanicians.

All are agreed that commercial aviation must be developed, but they realize, on account of the present uncertainties in aircraft performance, comparatively short life of material, and the risk to life and property involved in operation, that commercial aviation will not develop satisfactorily unless it is assisted by the Government.

The best assistance that can be given to commercial aviation is the enactment of legislation necessary for the prevention of avoidable risks. Risks to life and property—the greatest detriment to commercial aviation development—are due to the following six causes:

(*a*) Faulty design or inspection that may lead to a failure of material that can result in loss of control, collapse in the air, or fire.

(*b*) Operation by incompetent pilots.

(*c*) Getting into the air from an unsuitable place.

(*d*) Forced landings in localities outside of gliding distance from a suitable landing place.

(*e*) Running into very bad weather conditions, especially fog.

(*f*) Collision.

It is realized abroad that all of the above six causes can be almost completely eliminated through the agency of a suitable governmental organization, and that there is no other satisfactory means of avoiding unnecessary risk to life and property in commercial aviation. With the risk reduced to a minimum the other two detriments to commercial aviation will eventually disappear (uncertainties in performance will be cured and durability of material improved in aircraft in the same way they were cured in motor cars—namely, through the efforts of many different engineering groups in competition); but progress in aircraft design will be more rapid than progress in motor-car design if the Government assists the industry by carrying on the standardization work, the research work, and the experimental work on fundamental elements of design. Unless there are governmental research and test facilities and data accessible to the private individual, only the few large corporations who are able to maintain private laboratories can make any real progress in new aviation design. In Great Britain, France, and Italy centralized organizations for technical development and the control of commercial aviation along lines to avoid the six causes of risk to life and property listed above are already in effect or planned.

In these organizations some of the important functions that relate to commercial aviation are as follows:

Liaison with other Governments on all international affairs in aviation, such as laws governing international air routes and air traffic, rules of the road, international codes for signals or other communication between one aircraft and another and between aircraft and surface stations, weather reports, international standards for charts of air routes showing landing places with their designating marks and other necessary information for landing, international standards for day and night marks and signals for aids to navigation. It will be seen that most of the above are means for avoiding risks to life and property in aviation; they are those that help the air navigator in locating safe landing places, help him to avoid collision in the air, and to avoid running into areas of unsafe flying weather.

Planning commercial air routes throughout the country; also routes to and throughout the colonial possessions. This includes the

selection of safe landing places, the preparation of charts and information (similar to sailing directions) suitable for use in aircraft, and the equipping of routes with standard marks, signals, and other communication systems required to facilitate their use.

Promotion of the improvement of air routes. This to be effected by arranging for legislation or other procedure that will create new landing places and thus shorten the flying distance in a route; the first route established between two points will sometimes be considerably longer than the straight line distance owing to the necessity for making detours around large areas where a safe landing is impossible.

Preparation of regulations governing the use of all routes and landing places with a view to the avoidance of collision in the air and on the ground (in the future there will be a congestion of traffic on certain routes that will necessitate special lanes of flight and uniform procedure in getting into the air and landing). Preparation of regulations governing flight over localities where accidents to aircraft involve risk to individuals and property on the ground.

Supervision of all civil schools for training pilots as regards methods and extent of instruction in preparation for qualification for flying licenses. Preparation of physical, mental, and practical test requirements for all civil pilots and the issue and revocation of their licenses. This is the only sound method of avoiding incompetent piloting—one of the causes of risk to life and property.

Inspection of design and construction of all but Government types of aircraft as to their fitness for aerodynamical, structural, and mechanical safety in flight; issue of licenses for their operation. Periodic inspections of civil aircraft and issue of regulations for the purpose of insuring the proper care and preservation of aviation material and preventing its use when no longer in safe condition for flight. This is the only sound method of avoiding failures in material that may result in loss of control, collapse in the air, or fire.

Research work and experimental and test work in all branches of aviation development that are along lines common to military and naval aviation as well as to commercial aviation. Publication of technical facts and data that will be helpful to the aviation industry and to inventors.

Cooperation with the aviation industry and scientific societies in the development of standards in quality of materials, in practices, and nomenclature; also, in so far as it will not stifle invention, the standardization of certain parts, fittings, and arrangements.

In addition to providing these organizations, the Governments abroad are helping the industry in other ways; for example, all three Governments have provided military aviators and mechanicians for

missions sent to other countries to demonstrate and advertise the product of the private manufacturers; such missions are now in South America, and the Far East. In these projects the manufacturer is further assisted by arrangements with the Government for purchase at low prices of aviation material from the excess war stocks. Each government at the close of the war had a stock of aviation material on hand considerably beyond the needs for peacetime military and naval exercises. Retention of this stock in Government storage would simply mean a large expenditure for its upkeep, with no prospect of its being used before it would become obsolete or so old that further effort toward preservation would be futile. The diversion of this excess stock to commercial use benefits the Government not only by effecting a partial return of the original investment and a saving of further upkeep expense, but also because it affords another means of encouraging activity in commercial aviation.

Although the distances in Great Britain, France, and Italy inside the boundaries are not great enough to make aerial postal routes much superior in time saving to the railroads, a number of routes have already been established. In France one route—Paris-Strassburg—is being operated entirely with military aviation personnel and material for the purpose of gathering data in operating methods and costs.

In addition to the internal routes in operation abroad, there is a daily aeroplane service between London and Paris; also the following aeroplane routes are being prepared: From England to Cairo and the Cape and Cairo to Bombay; from France to Algeria and Morocco. These routes will carry mail, express, and passengers. Great Britain is investigating the possibilities of over-seas routes not only to Canada and the United States, but also to South America and Australia. The flight of the *R–34* from Scotland to America and return has given them much valuable data on the subject of long over-seas flights with lighter-than-air craft; well-planned experiments are being conducted for improvements in fabric and structure of rigid dirigibles that will eventually make that type independent of the large and costly sheds that are now essential for their maintenance.

It is the general opinion abroad that if commercial aviation is given a fair start by suitable governmental guidance and assistance it will require only a few years to develop into a utility of real economic value; it is believed that eventually aviation will become one of the world's greatest transportation systems. It is well understood abroad that commercial supremacy in the air will mean much more than supremacy with a merchant marine, for the merchant ship can not be converted in a few hours into a ship of war.

Centralized Control of Aviation Affairs.

It is well understood abroad that aviation has a peculiarity which makes it unique—namely, that the greater part of the design problems are identical for all classes of aircraft—military, naval, and commercial. The difference between naval type and military types are gradually growing less; at present the most efficient aeroplanes for use in the British fleet are nothing more than Army types—land machines—with the addition of air-bag systems to keep them afloat in event of forced landings on the water. The differences between service types and commercial types at present are simply the substitution of facilities for carrying mail, express, or passengers in place of the armament or high explosives; this applies both to flying boats or seaplanes as well as to land machines.

For the moment in new design of commercial types there may be a tendency toward lower speeds in order to lessen the material losses due to forced landings in localities where there are not sufficient suitable landing places. But when, as eventually will occur, there are air routes with good landing places always within gliding distance speed will go up again in commercial designs, for high speed is the one reason for existence of this new system of transportation.

In view of the above it is foreseen that, besides the possibility of coordinating effort in all the research work incidental to improvements in design, there are possibilities for extensive standardization in materials and manufacturing processes for all three classes of aircraft—military, naval, and commercial. The effect that governmental production will have on private manufacture is obvious; as far as governmental design in detail is concerned experience has shown that this causes a reduction in quality and numbers of the aeronautic design groups in competition and a consequent delay in engineering advances. It is agreed abroad that there should be a central organization to act as the agency for supply of all aviation material for the Army, Navy, and other departments of the Government that use aircraft—this for economy and efficiency in time of peace and for the avoidance in war of confliction between Army and Navy orders. A centralized agency for supply can maintain such contact with the whole aircraft manufacturing industry and its sources of raw material supply that the maximum output in aircraft production can be attained promptly in time of war.

In Great Britain an air ministry was established before the close of the war. In France a department for the general coordination of aviation is attached to the ministry of war; in Italy there is a centralized department of aviation under the minister of transportation; in both France and Italy the opinion appears unanimous that these arrangements are only transitory, pending the interval re-

quired for affecting legislation creating an air ministry in each country.

In both France and Italy it is believed that the scope of an air ministry should not include control of military and naval aviation personnel and operations. Also it is believed that the army and navy should conduct independent training of their aviation personnel except in that kind of tuition that is common to all classes of aviation; furthermore, they believe that each service should carry on the experimental aviation work that is of a nature exclusively military or naval, for that kind of work always requires the cooperation or assistance of other branches of the service it is developed for.

In Great Britain the air ministry besides controlling or supervising the activities thus far discussed controls naval and military aviation in all phases except distribution and operation of the air units detailed to duty with the army and navy. In spite of criticism there is no doubt expressed that in the majority of respects Great Britain has the most highly developed and efficient organization thus far established for the development of a nation's air resources. That there are certain defects in this organization is not at all surprising when the short period of its existence is considered.

There has been, and still is, opposition to the existence of the air ministry, principally on the part of the British Navy, which has been more affected than the army by certain unsatisfactory features in organization. The principal difficulty in the application of the air ministry system to the Navy has been due to the mixture in personnel on naval vessels carrying permanent aviation details. The aviators in these details, although all nominally the same sort—commissioned officers in the Royal Air Force—have actually been of three different species, so to speak—namely, aviators formerly naval officers, aviators formerly Army officers, and aviators with no previous naval or military training. The original idea in the training system appears to have been as follows: That any officer or civilian qualified as an aviator capable of being assigned to any one of several different kinds of aviation duty—namely, aviation with troops, aviation in the fleet, coast patrol (antisubmarine) aviation, or raiding operations—also that an aviator could be shifted from one kind of duty to another and after a very short interval to settle into the new routine perform all of his new duties satisfactorily. Perhaps during the war questions as to the efficiency of this system had to be waived in view of the urgent demand for replacements; as I have said before, no one was prepared for the enormous expansion in aviation personnel, also the number of casualties, from death or other causes, was far greater than anyone had expected. (The flying life of the British aviator on the western front averaged a little more than fifty hours.) At any rate it is now admitted by high command

in the Royal Air Force that actual practice has shown the jack-of-all-trades system is unsatisfactory; the need for specialization in certain classes of aviation work is growing steadily more imperative.

Experience in the British Navy has shown that an aviator attached to a ship in the fleet can spend comparatively little of his time in flying. There is, and always will be, much time in the fleet devoted to activities that interfere with or actually prohibit flying for the time being—such as, fleet tactical exercises, emergency drills (fire, collision, and abandon ship), landing force drills, making long passages at sea, etc. Consequently an officer who has nothing but aviation duty aboard ship has too much spare time on his hands; outside of his flying time there is not enough for him to do in supervising the care and preservation of his aviation material and in preparation of his aviation reports to keep him fully occupied during working hours. His mechanicians also, if not available and qualified for other duty aboard ship, are unoccupied a large part of the time. Space is not available on naval vessels other than aeroplane carriers or aircraft tenders for any but minor overhaul or repair work on aircraft material. Therefore, unless the whole aviation personnel stand watch or take some other part in the ship and fleet routine outside of their highly specialized and infrequent duties in aviation, they are idlers (in the naval sense), besides being often idle, and are not very different from passengers.

Now it is well known in all navies that the morale and discipline of a ship's company will suffer if there are officers or men unoccupied and more or less in the way when everyone else is busy; also it is well known that too little work is bad for the morale of officers and enlisted men in any environment, and this is especially true in the close confinement of shipboard life. As a means of avoiding this situation it is sometimes suggested that the aviation detail need not be a permanent part of the ship's organization; that the details can be placed in the fleets temporarily during the times they are needed—namely, for target practice, scouting exercise, and torpedo exercises. This, besides being impracticable for a fleet that does much cruising, would seriously interfere with the battle efficiency of the ships. Modern gunnery training methods are based largely on the development of the teamwork spirit for competition between ships at target practice; no ship can be expected to reach high attainments in gunnery if a part of its fire-control organization—a part of the gunnery team—are only temporarily members of the ship's company. As Admiral Beatty said to the aviation mission, "the aviator who spots the ship's gunfire in an aeroplane is just as much a part of the ship's fire-control organization as the officer who rings the bell for salvo firing."

Other reasons why the aviators for work in the fleet should be naval officers are as follows:

Scouting prior to battle is an exceedingly important duty that will be performed by the naval aviator. Intelligent and accurate information on the numbers and character of the various units in the enemy's fleet, and their tactical disposition and movements, will be of the greatest value to the commander in chief and the other flag officers; but incorrect information at such times will be worse than none at all. No one who is without ample naval training and association will be able to classify the various types of enemy ships in a large mixed fleet; no one who is without the experience in fleet and squadron tactics that is gained by deck watch in maneuvers will be able to analyze the disposition and tactics of a large fleet. It can not be said that for this work the aeroplane pilot may be simply a chauffeur carrying an officer as passenger qualified to make the scouting reports, or that photography will obviate the need of a trained observer. The necessity for utmost promptness in this work and ability to evade the enemy's air screen may make it necessary, frequently, to use the fastest and handiest type of aeroplane available, which will always be a single-seater; or when a two-seater is used, the pilot will have to carry on the surface observation while the gunner is giving his undivided attention to observation in the air ready to fire instantly.

Attack on enemy ships by aeroplanes carrying torpedoes or bombs is a recent development in naval aviation that promises to have as much, if not greater, effect on naval strategy and tactics than has the introduction of the submarine. The suddenness with which such an attack must be made against ships well equipped with antiaircraft defenses (and these must steadily improve) demands pilots for this work who have had ample naval training. There must be no doubt at all in the pilot's mind as to whether the target is an enemy ship or one of his own. To this end he must be so familiar with his own ships that he can recognize them at a glance even when low visibility from one cause or another makes their identification marks illegible. For this work it will always be wasteful to carry some one additional to the pilot for the sole purpose of recognizing ships. Any additional man or men that can be carried in the future must be gunners, and they should never be distracted for an instant from observation in the air.

Arguments on the necessity for using Army personnel for the aviation work incidental to military operations are similar to those given above. Conditions from the professional point of view are much alike; but in military operations there is not the close personal contact of the aviation personnel and the other personnel such as exists in the crowded condition of shipboard life. Furthermore,

military aviation exercises are not interfered with by military exercises unrelated to aviation, and therefore there is no difficulty in keeping the aviation personnel fully occupied.

A change in the Royal Air Force organization is about to be made for the purpose of obviating the difficulties experienced with a mixed personnel: Naval officers will be detailed for naval aviation duty and Army officers will be detailed for aviation duty with troops. Officers so detailed will be recommissioned temporarily in the Royal Air Force for a period of about three years, during which time they will specialize in the aviation work of their original services. At the end of the detail period a majority of them will resume regular service in the Army and Navy; the others will remain permanently in the Royal Air Force, the number selected being dependent on the vacancies in the permanent list.

This change is not only intended to cure the present difficulties in personnel, for it has two features that will be very important in the future. Return of the temporary details to Navy and Army constitutes a means of spreading real aviation knowledge and sympathy through the older services, which have so reluctantly recognized the full value of this great auxiliary to their efficiency. The aviators who return to their original service and eventually reach high command will have their experience as qualified pilots for a basis of their plans for the use of aircraft; it is pointed out that it is a rare occurrence for an officer to acquire the necessary sympathy and full understanding of this subject without having qualified as a pilot. Conversely, the selection of officers from the Navy and Army aviation details for permanent commissions in the Royal Air Force will have an equally beneficial effect on that organization; among those that fill the high command in the air force there will always be officers that have an intimate knowledge of the working methods and customs of the Navy or Army.

Besides advanced training of aviators, the other preparations for gunnery efficiency that relate to aviation are the development of types of aircraft suitable for use from and maintenance on board ship, together with the development of the aviation accessories incidental to sea flying, many of which must be incorporated in the design of the ship. To say that another department than the Navy may develop these features, seems as inappropriate as the thought that the Navy need not develop its types of torpedoes, torpedo tubes, air compressors, or determine the location of the torpedo accessories.

There is a close parallel between the activity just discussed and every other aviation activity in the fleet; all advanced naval aviation training involves the cooperation and training of other naval personnel and the use of naval material additional to aircraft and their accessories; all ships carrying aircraft must have certain equip-

ment for handling aircraft which, in design and location considerations, is inseparable from the ship design. It follows that the Navy will not have sufficient authority in its preparation for operations involving the use of aircraft unless it controls the organizations and facilities for advanced naval aviation training and development of naval aviation material. Also it is evident that such organizations can operate without duplicating the efforts of any other department of the Government that uses aircraft, provided the scope of the work is limited to that kind which is exclusively of a naval character.

There is some difference in opinions in both France and Italy as to whether an air ministry should include in its organization an air force for distant raiding purposes independent of the military and naval air forces. Although Great Britain has such a force in existence, there are individuals who do not consider its creation was sound policy. The arguments against the independent raiding force are as follows:

All forces in the air in war must act in harmony with either the Army or Navy, according as the campaign is military or naval. Experience in the war just ended shows that there should be an excess of aircraft personnel and material beyond the aviation requirements that are specifically military and naval—namely, scouting, patrol, photography, control of gunfire, torpedo carrying, bombing in the theater of war, and air fighting for the protection of the foregoing. The excess of personnel and material beyond these needs is then available for distant raids on munition and aircraft manufacturing and storage centers, railway centers, canals, bridges, naval bases, shipyards, fuel depots, etc. But such raids will always have an intimate relation to the strategy of the military or naval campaign. Consequently the air forces conducting them must be under the control of the commander in chief of the forces conducting the campaign, for he alone can decide where and when such raids should be made, if they are to be made to the best advantage in supporting his strategy.

It is argued that better efficiency and harmony in these operations will be attained if the personnel of the raiding force are members of the service with which they are operating—for example, if the raids are incidental to a naval campaign far from home the bases of the air operations will usually be in the fleet. In such cases the greater part of the raiding force personnel—those who never go into the air at all—will spend practically all their time aboard ship. The remainder who go into the air will spend their time aboard ship before and after raids. Consequently the whole personnel of the raiding force may be said to live habitually at sea during the campaign. It is well known that only those who have the sea habit—who are seamen in experience and training—can work efficiently and exist com-

fortably and harmoniously for long periods afloat. Therefore it appears better to provide for raiding squadrons in a naval campaign by maintaining naval aviation personnel and material beyond the needs of the specific naval aviation work referred to above. The raiding force then could be drawn on to make up unforeseen wastage in personnel and material in the other naval aviation operations; or, conversely, if the commander in chief decided for the moment that raiding operations are more important than ship operations he could draw on his ship and carrier aviation personnel to temporarily strengthen his raiding squadrons. In either case there would be no mixture of personnel, all would be under the same laws, discipline, customs, and tradition; all would have had the same kind of aviation and service training, and all would "speak the same language."

A similar argument to the above is heard in the objections from the military viewpoint to the creation of an independent raiding force; also both services feel that the existence of a separate air force under an air ministry that controls the material supply for all three offensive branches in aviation might cause them embarrassment in the effort to keep sufficient aviation material on hand. As one British Army officer remarked, "It is possible the independent force will get the cream of the production facilities and the Army and Navy will get what is left over."

Those in favor of an independent raiding force state that in the preceding arguments one does not look far enough into the future and that there are serious objections to the plan suggested for providing a joint Army and Navy raiding force. It is granted that, for the time being, aeroplane characteristics are such that in a distant naval campaign the raiding squadrons would have to base in the fleet unless a convenient shore base could be seized; but it is pointed out that the radius of action of aeroplanes is constantly increasing and that it is only a question of time when raids to any point in the territory of a possible enemy can originate from land bases at home or in colonial possessions. Surface craft would then be used in connection with raids only as stations for refueling or taking on bombs and for salvage work; the personnel of the raiding squadrons almost entirely would be stationed and quartered on shore; there would be little, if any, contact between them and the naval personnel other than the necessary contact of the high command and aides in each force. It is also pointed out that in the immediate future, while basing on the fleet is necessary, it is reasonable to expect as much efficiency aboard ship with raiding force personnel as there now is with the marines. It is added that, in this connection, there is a close parallel in the status of a separate raiding force and the Marine Corps—an organization largely different from the Navy in its training, customs, and traditions. Both the marine guard and the raid-

ing squadron leave the ships for their principal activity—the one operates ashore, the other operates in the air. It is added further that the American marines have demonstrated quite thoroughly they can operate efficiently under orders of the Army as well as under the naval command, and there is no sound reason why a separately organized raiding force should not equal the efficiency of the marines in operation under either Navy or Army command.

The objections to depending on excess aviation material and personnel from Army and Navy for the organization of a raiding force are as follows: It is asserted that no one can say for certain that a war will be settled by either a naval or military campaign; it may end or it may begin with either, but in any case it is certain that early hostilities will occur in the air. Therefore it will be desirable to be in position to put the maximum numbers into the air for raiding purposes as soon as possible. Unless there is a separate air force for this purpose, the strongest raiding force available would be the combination of the raiding force of the Army and the raiding force of the Navy. This would result in a force with a mixed personnel, which certainly would not be as effective as a force homogeneous in its personnel. The tactics of an air raiding force is a new art that will develop quite independently of naval and military tactics, although the strategical problem involved in distant air raids may be related to either naval or military strategy. Experience for centuries has shown that best tactical results with any offensive or defensive force are only obtained when all its units are welded into a homogeneous body by constant study, exercise in tactics, and indoctrination along unified lines. To this end it is essential for the force to be under a strong centralized control. How will that be possible with a raiding force if a part of it is under the administration of the Navy? If the answer to the question is a joint Army and Navy board, those who have had experience with such boards remember the old saying, "Boards are long, narrow, and wooden."

It is added further that if there is only a joint Army and Navy raiding force it will be many years before it assumes adequate proportions or receives the attention it deserves. In the eyes of the Army and Navy high command it will for some time be regarded simply as an appendage of doubtful value and the first item to fall on when looking for the least unpleasant means for reducing their total appropriations. Estimates of appropriations for their raiding forces will accompany all the other naval or military estimates, and naturally the Navy and Army heads will argue more earnestly for their main projects. On the other hand, if the raiding force is controlled by the air ministry it is under a head who has no other kind of war-

making projects under his cognizance. His arguments for the need of funds will not be interfered with in his own mind by thoughts on other kinds of preparations for war. Furthermore, he can show that development and maintenance costs in his war preparations are intimately related to activities under his cognizance that are of a direct economic benefit to the country. His ministry as a whole is, in a sense, productive rather than nonproductive, like navies and armies. He can tell the long-suffering taxpayer that if and when the time arrives that war preparations are no longer necessary his whole war organization—aircraft and personnel—can be diverted immediately to mercantile pursuits.

The aviation efforts common to all branches of the Government that use aircraft are included in the duties of an air ministry. These are general research and development, supply, and general training (practical and theoretical). The other duties of the air ministry are supervision of commercial aviation affairs and the administration of a separate air force—here called the raiding force—which normally is independent of the Army and Navy.

Each branch of the Government that uses aircraft has direct control of its own aviation personnel and operations. The only variations to these are, first, all branches detail their personnel to the air ministry for general training; second, operations of the raiding force can be placed temporarily under either Army or Navy command.

Each branch of the Government controls the special (advanced) training required for those aviation operations that are distinctly different from operations in any other branch of the Government.

Each branch of the Government controls the special development required for equipment in aircraft material or accessories that is distinctly different from equipment in any other branch of the Government.

KITE BALLOONS.

Source: Reliable.

31 August 1918.

(7282.)

Topping-up Gear for Naval Work.

The use of balloons afloat on long patrols necessitates periodical topping up, which in small craft in rough weather is a difficult operation. Various arrangements to enable this to be done without hauling down on deck have been fitted and used by units to meet the special conditions applying in their work, some of which have proved successful and others have shown various points of weakness. The requirements are, first, that the gear should enable the balloon to be topped up quickly without the necessity for hauling down the balloon further than the V, that the hose used should be attached to

the envelope in such a manner as to prevent undue stresses, and arranged so that it does not cause movement of the car or incumber observers. Provision should also be made that in the event of it carrying away gas will not be lost from the balloon.

A system was designed which meets the conditions and which has been proved satisfactory by continued use for several months. This type has therefore been standardized and is now being issued fitted to all "M" type balloons.

The system consists broadly of a 4-inch hose laid into the balloon at a point on the center line on the underside of the envelope just forward of the balloonet diaphragm and thence along the envelope to a point forward of the car and down to the basket. At the point of entry is fitted a nonreturn system comprising two valves. The first consists of a 4-inch aluminum pipe projecting through the envelope with its walls pierced by large holes. Over these holes is fitted a rubber sleeve, and the whole operates in the same way as a bicycle valve. The gas passes through this valve not directly into the balloon, but into a funnel-shaped fabric sleeve some 8 feet long, which is closed at the end and secured to the envelope. In the underside of this sleeve holes are cut for the exit of the gas into the envelope.

The first of these valves forms a quite effective seal, and the second is only added as an additional safeguard should the rubber sleeve fail in the air, in which event the internal pressure closes down the funnel-shaped sleeve and prevents gas escaping. Fabric flap valves of this type, depending as they do upon the excess internal pressure to prevent leakage, will not prove effective when the balloon is bagged down in its shed.

The 4-inch pipe referred to as forming part of the first valve is formed into an elbow and fitted with a flange just above the bend, which enables it to be clamped on to the envelope by thumb nuts, and ring and rubber washer. The 4-inch hose leading to the car is then secured around the open end.

The hose is not led direct from this point to the car, but is secured at intervals of about 3 feet to the envelope by fabric bands up to about 16 feet aft of the valve. At this point it is heavily reinforced and triced up to three crowsfoot patches on the envelope, whence it is led to the main toggle, where it is similarly reinforced and secured. The part lying along the envelope is prevented from flapping in a wind by a fabric cover secured on both sides to the envelope and laced at its forward end to allow the nonreturn valve to be removed or examined.

The hose is not kept taut between the envelope and the main toggle, but sufficient scope is allowed to permit it to blow back in

the wind, thus bringing the pull on the attachment to the envelope as nearly tangential as practicable.

The 4-inch hole terminates in the male part of a quick-releasing coupling. The female part to fit it is secured to a length of hose kept on deck, which is connected to the gas-supply system in use. The points which require attention from time to time are:

(1) The rubber covering the valve which should be examined before use to insure it being undamaged and renewed as occasion offers and is necessary.

(2) At the point where the hose is secured to the main toggle chafing is likely to occur; if severe this may be overcome by fitting rubbing strips of leather or other material.

Valves, Addition.

For some time past kite balloon units in France have been using valves fitted with an addition which insures the pull of the valve line being transmitted at right angles to the valve disk, thus opening it evenly and stressing the springs equally. The addition consists of a light bridge crossing the valve on the gas side and secured to the wood base. It is formed of two side plates separated by distance pieces, and an aluminum sheave runs between them. The valve line runs over this sheave, the position of which is so fixed that the lead is centrally over the valve eyebolt, so insuring an even opening of the valve with an indirect pull on the valve line.

Internal Pressure.

A balloon fitted with the central inflation system for maintaining internal pressure has now had a severe test at sea under service conditions. The balloon was flown from a destroyer capable of steaming over 30 knots.

The ship steamed full speed both with and against the wind with the balloon at 700 feet. The balloon was steady and the nose showed no signs of blowing in. The fan of the electric anemometer blew out when the ship turned into the wind, thus preventing any more readings being taken from the balloon.

The same trials were repeated with the balloon at 2,500 feet. At this time the Ogilvie wind speed indicator registered 65 knots on the bridge of the destroyer, and it is estimated that the wind at 2,500 feet was at least 10 to 15 knots higher than on the bridge, thus making the wind speed at the height of the balloon 75 to 80 knots.

The balloon was towed for some time under these conditions and the nose did not show the slightest sign of blowing in, the balloon maintaining perfect form.

The trial was considered satisfactory, and on the balloon being transferred ashore the stiffened hood of the central inflating hole was examined and found to be undamaged.

The hood as constructed at present is stiffened with cane ribs and therefore has to be fitted separately. If this minor objection can be removed, the system appears to have sufficient advantage over the scoop system to warrant its adoption.

"R" Type Balloon Stabilizers.

It was reported from France that the stabilizers of "R" type balloons took an unduly long time to inflate before ascent, this being attributed to the weight and position of the deflating sleeves and covers which were said to cause obstruction to the flow of air into the stabilizers through the rudder inlets. An investigation was undertaken, therefore, to ascertain whether this assumption was well founded and what improvement could be suggested.

When the stabilizers of these balloons are deflated, the fabric hangs down over the inlet, and, owing to the form of the envelope, most of the weight of the stabilizers is concentrated on the after part, where it would cause most interference with the inflation. No actual measurements were made of the concentration of the weight, but it was estimated that at least two-thirds of the weight of the whole stabilizer was distributed over about 6 meters at the after end of the upper seams.

The weight of a complete stabilizer is about 52 pounds, of which approximately 40 pounds can be regarded as operating directly to resist inflation. Of this weight the deflation sleeve and cover accounts for only three-fourths pound, so that it is evident that its weight alone cannot exercise much influence on the result. In order to test this, the sleeves and covers were removed from an "R" type balloon and the holes covered with patches. This change effected no appreciable improvement, the stabilizers taking the same time to fill both with and without the sleeves in similar conditions of wind. It was then decided to try to keep the inlets clear by fitting a pneumatic stiffening around the inside of the opening, and rudder tubes $1\frac{1}{2}$ inches in diameter were therefore fitted for this purpose.

Again, however, no appreciable improvement occurred, the effort exerted by the tubes being insufficient to overcome the drag of the stabilizers, with the result that they did not exercise any noticeable effect until the fins were partly inflated, when the need for them had largely disappeared.

An alternative arrangement of the inlet sleeves was then tried. Instead of the side sleeves leading direct from the rudder to the underside of the stabilizers, others were fitted to the training edge of the latter, connected to a tube of double the cross-section area leading into the after end of the rudder. It was hoped that this would provide a better passage and that the sleeves would be clear of the stabilizer when deflated. In fact, however, no better results

were obtained, although the sleeves themselves were certainly less obstructed than in the standard arrangement.

It appears, therefore, that short of rigid air passages no improvement is likely to be effected so long as the present principle of inflation is retained.

It may be stated that the slow inflation of stabilizers reported from France is not generally noticed here except in very light winds, when complete inflation is not essential, it being found that if the balloon is let up on to the V and held there the stabilizers are fully inflated in from 2 to 4 minutes in a wind of 10–15 miles per hour. If quicker handling is required, it becomes necessary to inflate the stabilizers with a blower before ascent.

Fin Forms.

A valuable series of wind-channel tests have been made at the National Physical Laboratory, with the object of examining the merits of a variety of fin types.

The general scope of the tests was the measurement of forces and movements over a range of 24° in pitch and 20° yaw on three sizes of stream-lined fins—Caquot fins, flat plates, and combination of each —disposed symmetrically at angles of 120° about a model of 4–1 fineness ratio.

In framing a judgment on the aerodynamical merits of any design of a kite balloon the first consideration should be devoted to the magnitude of drag and the magnitude and sign of the yawing moment about the center of volume. Experience shows that but little trouble is generally met with in securing stable balance, but the provision of sufficient righting moment in yaw is certainly a matter of considerable difficulty.

Several factors have a bearing on this matter, but it is believed that the governing object should be the improvement in design of the rudder. This entails the reduction of drag in the whole balloon to its lowest practicable limits consistent with the provision of a large reserve of restoring moment in yaw.

A large number of measurements were made, from which it appears that the stream-lined fins, while markedly satisfactory as regards drag, were ineffective for restoring purposes in yaw, while the Caquot fins increased drag very considerably, but were much more effective in regard to yawing moment.

The difference in moment is most marked at small angles of yaw. At four degrees, for instance, the restoring moment due to Caquot fins is nearly three times as great as that measured with either flat plates or stream-lined fins of equal protected area, while the drag increased in approximately similar ratio. At greatest angles the difference is not so marked, but it is at small angles that restoring moment is of the greatest value.

There is little doubt that the great drag exerted by the Caquot fin is a considerable factor in the restoring moment exerted at small angles, but it should be possible to effect a considerable improvement, and a further series of trials are being made on other forms of fin with this object.

Several reports have been received to the effect that aluminum-faced rudder fabric lasts for a considerable shorter time than the envelope, on account of the facing deteriorating, followed by general porosity.

The present specification for this fabric provides ğms/M2 rubber inside with 15 ğms/M2 aluminum outside protective coating.

Two solutions were suggested, either to concentrate the whole of the proofing in the external coating or to increase the weight of proofing.

The first suggestion gave very good permeability results, but it was judged inexpedient to expose the coating intended to provide impermeability to the rough wear and tear incidental to the rudder; further, there was a possibility of mechanical difficulty in sticking the seams.

It was therefore decided to increase the facing coat to the same value as that used on the envelope (50 ğms/M2) and to reduce the inner coating to 30 ğms/M2, which should be sufficient to maintain air-tightness until abrasions on the outer surface could be repaired.

This total increase of 20 ğms/M2 represents an addition of about 11 pounds to the weight of the balloon.

AVIATION—HOLLAND.

Source: Reliable.

(11969.)

A German-Dutch company has been established at Fauguemont with the purpose of organizing an air service between Limburg (Maastricht, Heerlen, Fauguemont) and Germany.

For this service German airplanes and German aviators will be used. This company has bought about 10 flying machines.

There will be a direct connection Aix-la-Chapelle-Duren-Cologne. This company will most probably also busy itself with carrying mail from Limburg to Germany, and vice versa.

In Limburg landing places have been chosen at Maastricht and Heerlen. On the occasion of the national festivals, which take place on the 31st of August and 1st of September, this company will organize air demonstrations at Heerlen, Sittard, and Maastricht.

This company hopes to begin operations very soon.

COST OF AIRSHIP R–34 TYPE.

Source: Reliable.

28 August 1919.

(6964A.)

"Dr. MacNamara informed Lieut. Commander Kenworthy in the House of Commons that the cost of constructing an airship of the R–34 type was approximately £350,000. The cost of the housing shed at East Fortune, together with extension of wind screens, was approximately £166,000. Fourteen officers and 400 men were required at the station handling, berthing, cleaning airships, etc. The estimated total monthly cost of a ship in commission depended on the distance flown. Taking as the basis 8,000 nautical miles a month, at a speed of 40 knots, the cost would amount to about £2,600 at current rates for petrol, etc. This included wages of the crew and one-fourth of the total pay of the personnel required for handling. No further airships of this class were under construction, but six of improved types had been ordered and were in various stages of construction. The work upon them was being continued."

ORDNANCE.

EXAMINATION OF EX-GERMAN BATTLESHIP "BADEN" AT INVERGORDON, SCOTLAND, WITH PARTICULAR REFERENCE TO ORDNANCE MATERIAL.

Source: Commander Garrett L. Shuyler, U. S. N.

1919.

The *Baden*, after being scuttled at Scapa, was towed into shallow water before taking the bottom. Later she was pumped out and placed in the floating dock at Invergordon. It was possible on 31 July and 1–2 August to make an examination of this ship. The information obtained is not so thorough as it is hoped to have later. It is forwarded to the department as a preliminary report on the main features of this very typical German ship, which is probably the only one that will be salved.

General Features of the Ship.

The ship is about the same size as the *Pennsylvania* and H. M. S. *Resolution*. It was designed at about the time of the outbreak of the war, but not completed until after the Jutland battle. There is every reason to believe that she is considered by the Germans as the most modern battleship of this type. At any rate she is directly comparable with the *Pennsylvania*, *Resolution*, etc.

There are certain features of German ships which we have been led to accept, more through the speculations of various writers than from actual information, and it is interesting to see how in many respects the Germans were credited with certain features which they appear either to lack or to have to a lesser degree than popular opinion credited them with.

Among these may be mentioned the idea that the Germans had particularly specialized on "plunging fire." This is a very loose term and may mean almost anything, but it seems to involve the idea of having very strong protective decks and having guns which elevate to large angles of elevation. The protective decks seem to be only $1\frac{1}{4}$ inches thick, and the turret guns, instead of elevating to 20° or 30°, elevate only to 16° and depress to 8°. This was not accepted merely from reading the scale, but the guns were actually elevated until they reached extreme elevation at 16°.

The Germans are generally credited with an extreme economy of weight in all parts of the ship. This was perhaps more marked in the crew's space, but for the North Sea conditions the crew's living spaces were by no means so uncomfortable as popularly supposed. At any rate it would not be necessary for all hands to live on shore and go out only for an action. Economy of design in this respect can be well understood when the particular needs of the ship are considered. German ships for work in the Far East are understood to have much better accommodations than those operating close to North Sea bases.

But, however cramped all other parts of the ship may be, the enormous size of the turrets, and the tremendous waste in weight in armor in these parts was an outstanding feature. British turrets are much more spacious than ours, but even British officers were impressed with the enormous waste of weight in their heavy armor plates which resulted from making the turrets enormously larger than practically any other navy sees any necessity for. The turrets will be described in detail later, but the idea can be illustrated by a few dimensions. The barbette is about 35 feet 2 inches in outside diameter. Our design for a turret containing three 16-inch guns, as compared with two 15-inch guns in this turret, calls for a barbette of only about 3 feet greater diameter. When it is considered that each of the guns in the turret will be of 1-inch greater caliber than these and that there will be three guns instead of two and that the barbette will be only so slightly larger, it is believed that nothing more need be said to substantiate the view that in turret design the Germans have wasted weight enormously, however much they may have economized elsewhere.

As regards the water-tight integrity of the German ships, it has been the popular idea that a very extensive subdivision or some other

feature of this kind has resulted in making the German ship much harder to sink than corresponding ships of other navies and that the German constructors, rather than operating personnel, have been responsible for this good showing.

In the engineers' department the condensers are put in a separate room and boiler rooms are quite small. It may be said that the general subdivision throughout is good, rather than poor, but there is no extraordinary absence of passageways, or very extreme subdivision of compartments to the extent which is generally believed. The after torpedo room is enormous. It is much larger than that of the *Pennsylvania*, and the naval constructors estimated that it would hold 700 tons of water. The water-tight doors are much lighter than ours, being stamped of about 15 plate and very much dished. The three dogs on each side are interconnected, but are somewhat leaky. The bulkhead fittings, where cables pass through, have very poor stuffing boxes, which seem to be improperly packed, and during the salvage operations these leaked so badly that the leads had to be cut and the holes plugged. Some German officers said that this was war-time work and not up to the usual standard; but, at any rate, below decks there is nothing which entirely differentiates a German ship from other ships as regards water-tight integrity.

In the report on the *Goeben* it was stated that there was a 15-foot tin instruction model of the ship which showed every compartment and all pipe connections and could be taken to pieces so that any compartment and its piping could be viewed. It was stated by the officers of the *Goeben* that the secret of German ships keeping afloat with water in them much better than other ships was not because of such mysterious feature of design, but because of the most thorough and painstaking instructions and incessant drill of the personnel so that everyone would know the right thing to do when the ship was flooded. The valves appear to be much more prominent.

There are name plates of white enamel with black letters, very easy to read, which are placed everywhere. A model of the ship such as described on the *Goeben* was found on the *Baden*. It is evidently the standard practice in the German Navy to have such a model that general instructions may be given to everyone and made clear to the great number of people on shipboard who are able to learn little or nothing from a blue print. Everything in connection with valves for flooding, etc., has evidently occupied a tremendously greater importance in the minds of the officers of the German Navy than in our own Navy. It seems most reasonable to suppose that, instead of merely a few members of the carpenter's gang and repair parties and some of the engine-room force knowing about the valves and what to do with them, practically everyone on a German ship has had most thorough instruction.

Their efforts were evidently well repaid. It is believed that it is difficult to lay too much emphasis on this point, and certainly all the service should be disabused of the idea that the good showing in keeping German ships afloat when flooded were due only to the German constructors, and that possibly we would learn from them some peculiar construction which would permit us to slight drills of this nature. In fact, the whole lesson to be learned is that incessant drill in this respect, more so than we have ever considered possible or feasible, is undoubtedly responsible for whatever success the Germans have had in keeping flooded ships afloat.

Outside Appearance of Hull.

The bow is less full than on our ships. The extreme forward part of the deck does not project outward with a flare to keep the spray from coming on board. There are three propellor shafts. The outboard shafts are very much more incased in hull plating than is the case in our ships, and the projection which is formed by the plating coming around them descends downward from the hull instead of projecting horizontally from the inboard part of the ship, as is the case with the *Pennsylvania*, etc. The docking keels are broader than ours and are not tapered to the bottom, but are the same thickness the entire depth. There is a bow torpedo tube. There are scuttling valves in the ship. Almost all the valve openings are very large and of rectangular shape, covered with gratings. There are one or two intakes with scoops in them. There are two rudders, but these are shipped without a skag or dead wood of any kind. As the ship is narrow over the rudder heads and it is desirable to have the lower parts of the rudders come between the center and outboard shafts, the whole rudder is not vertical, but is shipped at an angle. In other words, the axis of rotation is inclined outboard at the bottom, and there is a considerable spread. There are two large lifting eyebolts over each rudder and propeller. The propeller bosses are very small and not all good stream-line form. There is a very heavy and massive casting at the after end of the keel to support the after part of the ship's structure in dry-dock. This is surprising, as the stern is by no means so much cut away as the *Pennsylvania*. The torpedo-tube openings are very large, due both to the size of the torpedoes and to the fact that the tubes are inclined 15° forward of the beam. There used to be a forward torpedo room, but after the ship was mined in the forward part this was abandoned and the space subdivided into storerooms. The forward torpedo tube on the center line has a cap which swings upward. The edges of the plating are beveled and the plating is lapped over, as we see it on many merchant ships. The ship has waterways similar to our ships, not omitting them as in recent Brit-

ish construction. There is a large staple on the starboard bow near the water line for mooring to a buoy. It was observed in Germany that these were always used for this purpose.

Ground Tackle.

This was generally lighter than ours. The anchor weighed 8,000 kilograms and the chain measured 3 inches in diameter. There was a large windlass room. In fact, it was unaccountably large and wasted much space. Their windlass seemed to be clumsier than ours. Apparently they used no shackles. In all cases, both for connecting the anchor chain to the anchor and for connecting up the different shots of chain, a peculiar special form of link was used. This link was not solid, but had joints on both sides, which engaged and were fitted into each other. To engage the two halves they would be moved in a direction perpendicular to the longer axis of the link. The motion would be in the plane of the link. They could not then come apart unless separated in this way, and to prevent such separation the stud was then inserted and held in with a leaden pin. These links were of larger diameter than the other links, but by no means so clumsy as a shackle. In fact they could not be distinguished from the rest of the chain at first sight, and it was only when the shackles were searched for that they were discovered. One has only to drive out the pin and rap the stud with a hammer and the link is supposed to drop apart. This may be interesting for experimental purposes, but the Germans have not had a particularly good reputation for making quick moors or for being particularly good with their ground tackle.

Masts and Tops.

The masts were of a tripod form, with three platforms on them, one above the other. The upper platform was for the fire control and was above where the parts of the mast joined. The middle platform was for a range finder and was just at the junction of the three legs of the tripod mast. The lower platform was just below and encircled the vertical leg of the tripod. It was apparently for lookouts only.

Upper Top.

This was 14 feet long in a fore-and-aft direction and toward the after end was of somewhat circular form, about 7 feet in diameter The forward part of it, however, was narrower, being only 4 feet broad and rounded in semicircular form on the forward end. It was comfortably high and completely boxed in, except for sight slits, and covered by a water-tight roof. A range finder was carried on the forward part of the roof, and an observer sitting inside in a revolving frame carried from the roof could operate it. There was

a range visual on either side of the top. A trapdoor led to the top below and another one down to the vertical leg of the mast.

On the center line, one in front of the other, were two fire-control instruments, which had been removed, leaving only their bases. These bases were trunks and rectangular, and although nothing much but the casting remained they were apparently for a revolving type of instrument, which would extend up through holes in the roof. These holes were 15 inches in diameter, and the periscope covers were 26 inches and 30 inches high. It was judged that they were target-bearing indicators, that they were of different heights, so that one would lock over the other, and that there were two of them, so that divided fire of the main battery could be used. There was a piece of 12-wire cable near one of them. They were manufactured by the Siemens Co., and others like them were found in various parts of the ship.

Middle Top.

This top was 16 feet across in an athwartship direction and about half as long fore and aft. The central part of it was occupied by the tripod masts, which at that height were exactly abreast each other at an athwartship line. The top extended around the front and on the sides of these masts and back beyond them to the side. Abaft the parts of the tripod mast it was cut away. At a height of 5 feet from the deck there is a row of windows 15 inches wide. A curved track ran around the front under the roof, and carried on it a frame for a range finder of about 10 feet base. Supported on this overhead-trolley track a range finder could be moved around to any part of the top and could be used by looking out from the row of windows, which could all be opened where necessary. This feature of overhead suspension from a trolley track for range finders, which have to work in a platform which has a roof and is blocked by a mast in the center, is an ingenious one. We could well use it for our top range finders.

Lower Top.

This lower top is built around the vertical leg of the tripod mast. It has a sloping roof and glass windows all around it. It is the ideal place for lookouts, and sectors could easily be assigned to the different lookouts on watch. There are no signs of any instruments ever having been in it. One could spot from it.

The legs of the tripod mast were apparently the same diameter all the way up. The fore topmast was steel. In general the tops were by no means so large as British tops, nor did they have semaphores and other signal arrangements in them. There was no sign of a spotting glass as such in the top, unless what has been described as a range finder in the upper top was in this nature. There would be room for

spotters in the lookout top, but these points are uncertain. It is believed that the idea of having a range finder in a top so mounted that it could travel around and so overcome the difficulty of interference with instruments located centrally in the top, or with masts, or other supports occupying the center of the top, should be carefully considered in our own future design.

Searchlights.

The searchlight positions were eight in number, four forward and four aft. In each place there were two, one above the other. They were fitted with distant control and heavy 2-inch shafting with universal joints and ball bearings. It was much like the Chadburn gear used in the British Navy and considerably heavier than our own gear, where one of the controls takes the form of a pipe inclosing the other shaft, which runs inside of it. The reflectors were about 45 inches in diameter. There was both an iris diaphragm and a signaling shutter arrangement. The carbons were about $1\frac{3}{8}$ inches in diameter with a $\frac{5}{8}$-inch core.

The name plates read:

> "Gleichstrom, Metzspannung 75-120 volts; Stromstarke 150 amperes; Lampenspannung 74 volts; positive kohle 36/5×410 mm. neg. 14×410 mm. Spiegel Durchmesser 1100 m. Brennweite 480 mm. Date 1915."

The carbon was marked "Marke Siemens-Schukert 1913."

The full number of searchlights was not on board. There were good davits for getting all searchlights up to their positions or for striking them below. There was no carbon rotating device apparently, and there were no signs of any of the improved arcs such as the Beck or Sperry patterns. The glass covers of the searchlights were of the older type, composed of a series of vertical strips of glass. There was no sign of a glass cover of the type developed in the British Navy, which is convex like a reflector, shaped so that blasts from the guns will be better resisted. The searchlights would elevate to 90°.

The above information appears to be of no special interest in that it discloses no startling feature. We can regard it, however, as supplying a very great amount of negative information. By this we mean that it is evident that the searchlights were not at all modern Germany had as good information and facilities for building the last word in searchlights as anyone in the world. Obviously they did not even attempt to build them or to modernize their searchlights on a very modern vessel. They must have been very little interested in searchlights. In other words they must have thought that their excellent star shell would be quite sufficient and better. This is in line

with ideas on the subject in both the American and British Navies, and it seems that the most interesting thing learned from examining these searchlights is that their obsolete appearance shows that the Germans are altogether in favor of star shells instead.

Range Finders.

There were four range finders of long base, between 25 inches and 28 inches approximately, mounted in the turrets over the trunnions in much the same fashion as our earlier turret range finders, but less cramped. They were not in place. They had 5° independent train. There was hand training gear, and also a very small hydraulic apparatus on the right-hand side, which apparently could also be used for training them.

There were seven other range finders on the ship, all of about 10 inches base. These were inclosed in cylindrical casings covered with sheet metal and well lagged inside. There were flanges on the horizontal diameter so that they could be readily taken apart. On each side of the superstructure there were range finders mounted on deck so that they could be operated from below. A hole was cut in the deck, and there was a vertical cylindrical casing in the vertical axis of rotation, and the range finder extended across horizontally on top of this. The operator was sheltered by casemate armor below and shoved his head up through the hole in the deck, which was surrounded by the vertical cylindrical casing. Probably these range finders have eyepieces which come down some distance below the range finder itself like hyposcopic sights. This idea was a common one throughout—to cut a hole in the roof or deck and to mount the range finder over it, and then to have the operator stick his head up through the roof or deck to operate it. The range finder or spotting glass in the upper top was also mounted this way so was the one in the conning tower, and so was one stuck on top of No. 3 turret. It appears to be a very good way of mounting range finders which have not been originally provided for. The broadside mountings, however, are not as suitable for our use as we have no casemate armor.

Summing up, the seven 10-foot range finders were arranged as follows:

1 in extreme top.
1 in middle top.
1 in conning tower.
2, one on deck of each broadside on gallery the outboard of superstructure and operated from behind the casemate armor.
1 on after conning tower.
1 on No. 3 turret.

7 total.

None of these range finders was in place, but it is believed that they very closely resemble a certain 10-foot base range finder of German manufacture.

The German idea seems to be to have not only the usual long-base turret range finders, one in each turret, but also to have well distributed all over the ship, so that under any conditions a considerable number will remain, a large number of 10-foot base range finders so mounted that they can have very wide arcs of train. Apparently the ones on deck are principally for the broadside battery. It is understood, however, that German practice is to do a great amount of averaging of many range finders of no greater size than this and to rely upon the accuracy of such average readings. In other words, if we can not have a few nearly perfect range finders another good solution is to average results of many smaller ones. These smaller ones have a greater arc of train, some of them have better location than in the turrets, and all of them would never be disabled. The operators are much better covered in every way than with our own outside range finders, even those we mounted on turrets and put spray shields for.

Conning Towers.

The forward conning tower is arranged practically like our own, except that it is more nearly round and the fire-control booth in the rear extends up higher than the forward part of the turret, so that it can look out over it by direct vision through slits as well as simply through periscopes. It is not entered by hatches but by a door in the rear. The side slits differ from ours in being smallest at the outboard face of the armor, where there is a slit about the same size as in ours. Inboard of this slit the opening enlarges as a sort of funnel until it opens out in a round hole just about big enough to put the face into. When the sight slit is not in use, a circular plate about 1 inch in thickness and with a bayonet joint that engages in the armor can be put in to keep out fragments. The fire-control booth is relatively larger than in the *Pennsylvania's* conning tower. One can not see as well astern as in the *Pennsylvania's* conning tower. The armor is about 14 inches thick. The most remarkable and interesting feature is that instead of the walls of the conning tower being vertical they are inclined 10° outboard at the top. This makes the conning tower somewhat roomier, and weight is saved by the reduction of the size of armor below. Another great advantage is that any projectile striking the conning tower strikes it 10° more obliquely than it would do if the armor were vertical. The side armor of H. M. S. *Hood* slopes outboard at the top 10°. This is exactly the same idea. It is believed that the inclination of vertical armor in this fashion by inclining the top outboard, so that the angle of fall

of all projectiles striking it is increased, is a very valuable improvement, which we note from several sources is continually coming into use. It should be endeavored to utilize this principle in our own design wherever it can be done.

Fire-Control Instruments.

As only the bases of the fire-control instruments remain, their nature could not be ascertained. These bases are about 15 inches square and come up nearly waist high. Multiple-wire cables, usually cut, remain near some of them. On some there is a single training handle still in place. In the turret, although the sights were stripped to a great extent, there seemed to be an arrangement much like the "mechanical director firing gear"—i. e., a device by which the fixed director correction on an arbitrary scale could be applied at the gun. Up to the time of leaving, however, no conclusive proof had been found that there was any director firing in elevation. It is safest to conclude that the fire-control instruments are of the nature of target-bearing instruments, which may or may not be fitted with a simplified director firing gear in elevation.

In the main top there were two of these instruments. In both forward and after conning tower there were three. There may have been some on the bridge. Probably the ones in the top were for divided fire of the main battery. On the lower sections were three, for working all or half of the main battery on either side, as well as a broadside battery. The connections of these instruments had to be largely conjecture, but it is certain, however, from their number and location that divided fire of the main battery was provided, as well as control of the broadside fire. One must presume that the connections allowed a great flexibility of grouping in shifting from one part of the battery to the other, and it is evident from the number of instruments that there would be a great number of secondary positions which could be used and that practically any requirement for divided fire, both of the main battery and possibly groups of the broadside, could be met. With the present information it is unsafe to attempt to conclude more.

Guns.

The guns measured 56 feet 2 inches over all. They were 38-centimeter guns, practically 15 inches. The rifling was 45 feet 4 inches long. The powder chamber was 7 feet 7 inches long. From the face of the breech block to the breech face it was 3 feet 2 inches. The mechanism was of the Krupp wedge type, which worked beautifully, closing on $3\frac{1}{2}$ turns. (Note.—The breechblocks were found in No. 3 turret in place in the guns. These should have been removed when the ship was turned over, but evidently they were hidden some-

where about the ship and replaced after inspection.) The gun measured only 12 feet 8½ inches around the breech. At the muzzle it measured 5 feet 10½ inches around. Ten feet back the circumference was 6 feet 9½ inches; 20 feet back it was 7 feet 6½ inches; 21 feet 9 inches back it was 8 feet 9¾ inches; 29 feet back it was 9 feet 11½ inches. These measurements were roughly made with a tape measure, with the idea that from them a quick approximation could be had as to how heavy German guns are and how the metal in their guns is distributed. Real drawings will, of course, show more.

About 15 feet back from the muzzle there was an open joint of about seven thirty-seconds of an inch, and a little more open at the top than at the bottom. This was stuffed with oakum, and its discovery gave rise to a newspaper report that the Germans had destroyed their guns by oxyacetylene cutting and had covered it up in the hope that if fired the gun would burst. It was, however, simply an ordinary joint in a gun, and although certain officers, more familiar with wire-wound guns than with built up guns, ventured the suggestion that it was some sort of an expansion joint, it is believed that it was a joint which had come open as joints in built up guns so often do. The width varied somewhat from gun to gun. A steel ruler inserted in this joint entered about seven-eighths of an inch, and observing more closely with a light it could be seen that from this point on the joint did not continue straight in, but sloped toward the muzzle at 40° or 50°. The inner part thus resembled very much the construction used in our older locking joints.

At the muzzle there seems to be an inner tube about 2⅜ inches thick and an outer one of about 1¼ inches thickness, making a total of about 3⅜ inches. There is no bell muzzle. The grooves are about 100 in number one-eighth inch deep and about seven-thirty-seconds inch wide. The rifling is of uniform twist. The bore was in good condition, except that near the muzzle and out along the chase it looked a little dark, but there were no evidences of metallic copper in the bore. The lands and grooves are apparently the same width. There is a fillet in the bottom of the grooves but there are sharp corners on the tops of the lands. A uniform twist, a deep groove, a large number of grooves, and the feature of having the lands and grooves all the same width seem to be the principal characteristics of German rifling.

The figure 77,512 kilograms was discovered stamped on the breech face. This does not seem to be as light as would be expected for the size of the gun.

A small dial was found in the turret, which was apparently part of a muzzle-velocity corrector and graduated from 800 to 760 meters per second initial velocity. Probably the initial velocity of these guns

is 800 meters per second with the projectiles used on shipboard. Evidently the velocity does not exceed this.

Gas-Ejecting Devices.

In the loading position, which is apparently about 2½ inches elevation, the large opening on the side of the gun in which the wedge works matches up with a rectangular exhaust louver. There are two pipes covered with woven leather protection connected to the breech block itself. Apparently these introduce either air or water, or both, and the main feature of the gas ejector is that the gases are drawn out by an exhaust fan from the hole in the side of the breech housing. The ejected cartridge case laying in its tray immediately in the rear of the gun at the time might pretty well block the breech and keep the air from coming in that way or smoke from getting out.

Turrets.

The turrets are of enormous size, as previously mentioned. The barbette measures 110 feet 6 inches around, or about 35 feet 2 inches in diameter. The turret itself is practically box shaped and is about 30 feet wide. It is 31 feet 6 inches broad measured on the rear of the turret, which has, however, not much curve. On the center line the roof is flat and about 15 feet 5 inches wide. The sides slope down only part way to the barbette and at an angle by no means so steep as ours do. The turret is about 9 feet 4 inches or 9 feet 5 inches high outside dimensions. The low turrets are 2 feet 6 inches from the deck and the high turrets about 12 feet 6 inches. The front turret is not all in one plate but is in two. The lower part runs up vertical for about 5 feet, and a second plate well joined to this one slopes back at a steep angle into the roof; the slope appears to be more than 45°. The peculiar appearance is given to the turret by the fact that the range finder, which is over the trunnions, is well housed by a sort of hump, the roof not sloping away in this part. Access is through doors in the overhang, through which brass cartridge cases are also ejected. There is apparently no effort made to bring the trunnions as close as possible to the port plate as in our turrets. They are a great distance back. The port openings are closed by a well-fitting cylindrical shield of about 3½ inches thickness, the center of this cylindrical form being naturally the center of the trunnions. There are removable plates opposite the trunnions, although the purpose of these was not clear. The sights of each gun look out through slits in the vertical armor, outboard of the trunnions, and direct vision through these openings is also possible. The main training sight was between the guns and extended up to a sort of vertical periscope. There are also auxiliary training sights on either side. No sight telescopes were in place, but the holes for them were of cylindrical form, and their diameter

was about 3 inches. There was a peculiar foot pedal in the trainer's station, which by means of bell cranks worked a rod running up to the sight. The trainer's sight was not free, and so many parts were missing that it could not be told what this arrangement was. It was, however, apparently not a firing mechanism but connected to the sight, and most of those examining it guessed that it worked a prism in the sight (like the prism in the Henderson gear), so that by movement of the foot the trainer would at all times be able to keep on the horizon during a roll. If this were not the case, he would have a difficult time of it with his sight, which has no up or down motion.

The guns were 146 inches from center to center. The trunnions were very large and the trunnion seats about 12 inches broad. The trunnion diameter was about 15 or 18 inches, but this could not be measured. There were no roller or knife-edge bearings. Judging from voice pipe and other arrangements, the turret officer's station was between the guns with the trainer and close to the range finder operator. The turret was not divided on the center line, but the whole turret chamber was open. The turret roof was not as well supported as our turret roofs. There was one large H beam in the after part, but this was weakened by ventilating louvers passing through it. There are only three or four small ventilating ducts. The ventilating would not have begun to suffice for our needs, but for work in the North Sea and with such an enormous turret they would be adequate.

The inclined plate on the turret face is only 8 inches thick, as compared with the nearly 14 inches of the front vertical plate. Of all places to economize weight, this seems the most surprising. It is a most vital protection to the turret and so inclined that any study of the obliqueness of impact that we have made, especially with "plunging fire" at long ranges, makes the thinning of armor in this way hard to justify. Also the sloping sides are believed to be only 8 inches thick, instead of full thickness, as we would make them. Our own turret port plate arrangements seem better able to resist heavy projectiles.

The barbette armor in cases where it could be hit only a glancing blow—for instance, on the forward part of No. 2 turret, where No. 1 turret would shelter it—was thinned about 2–2½ inches. This seems reasonable.

Training Gear.

This was electric, motors being in the space below the turret. The teeth of the training rack were 11¾ inches wide, and all about 4¼ inches pitch. The turret was carried, not on roller bearings, such as we use, but on ball bearings about 8 inches in diameter. The

ball race above bore on the outboard side of the balls, and below the point of contact was on the inboard side. It was stated that there was some holding-down chips on the front of the turret, but these were not examined. There were elliptical armored doors through the barbette, in certain positions of train matching up to the openings in turret. Through these it would be possible to introduce powder. There was an interlocking device which threw a bar across this hole to prevent passage through it at times when the turret was so trained as to make this dangerous.

The shell room was in the bottom of the ship and the magazine on the next level above it. On each of these decks there was a large ring carrying a light truck, so that powder or projectiles could be brought out of the magazine, placed in ready tray, the ring moved around so that the powder or projectile could be put on it, and then by revolving the ring it could be matched up with the hoist and loaded into it, regardless of what angle the turret was trained to.

Elevating Gear.

The guns were elevated hydraulically from 8° depression to 16° of elevation. There was an inclined hydraulic ram with a cross head on its upper end. Two connecting rods of about $4\frac{1}{2}$ inches diameter and 40 inches long were attached to this and pushed on the slide. The hand gear was connected to a rack on this piston, the teeth being about $11\frac{3}{4}$ inches wide. The hand elevating gear was operated from a position outboard the gun and was very large and substantial. The rammer was hydraulic, and the loading arrangements were operated by the same power. They could also be worked by hand. In each turret an electric pump, with a hydraulic accumulator, furnished all hydraulic power for the turret. This was in most cases favorably commented upon by those familiar with hydraulic power.

Slides.

The slides completely encircled the gun like our slides do and were very similar to them. There were, however, no less than 24 grease cups on each slide. Each of these was of brass 5 inches in diameter and 2 inches deep and should hold a pound or two of grease. In fact the whole top of the slide seemed to be covered with a cluster of grease cups of these extraordinary dimensions. It is not understood why so many more than we use was necessary, unless the bearing service is much larger than with us.

Voice Tubes.

The voice tubes throughout the ship are of a smaller size than our own. Many have whistle arrangements for calling. Some have

wooden plugs to close them. In the engine room the voice tubes from the operating platform are covered with lagging. The largest voice pipe noticed on the ship was the turret officer's station and was a little over 3 inches in diameter. In the plotting room there are no funnel mouthpieces, but the openings come down and are arranged in a horizontal row, and apparently improvised fittings were inserted into all the round mouthpieces, so that the nose could be jammed well into it. It was, however, similar to our own standard-shaped mouthpiece. There seemed to be very little standardization of mouthpieces on the different voice tubes. The plain type with a wooden plug predominate. Those of elliptical shape were $3\frac{1}{2}$ inches broad and $2\frac{1}{2}$ inches high. No voice-tube head sets or evidences of them were seen. In the engine room near the mouthpiece there was a gate valve, which, by pulling down a lever, was supposed to make the voice tube water-tight. The officers who had charge of the salvage operations said that they were not efficient. In view of the valves generally used it seems improbable that the Germans have any voice pipes with diaphragms in them.

Summing it up, it appears that we have very little to learn from the German voice tubes, that we have ours better standardized, and that the Germans themselves in a most important voice pipe have used our own standard pattern, which fits the face well up over the nose. The apparent absence of head sets is surprising. Their water-tight valves are carefully thought out, but the reports of their performance are discouraging. Some of their arrangements of call whistles are not bad, however.

Turret-Loading Arrangements.

There is a large vertical hoist running from the bottom of the ship up to the turret-working chamber. This is divided on the center line, and there is a car on each side. Similar in some ways to those used in the British Navy, the car is in two sections, so that the upper section always stops at the magazine, remaining to be loaded with the powder, while the lower section of the car descends to the shell room, which is on a deck below. The shells are carried out of the shell room and put on one of four waiting trays. A circular ring around a hoist is rotated until a truck on it reaches the waiting tray. The ring is then revolved and the projectile, when brought to the right position, is pushed into the shell car from the side.

In the powder magazine the charges are handled similarly, except that everything is, of course, lighter. In this case, however, the two sections of the charge are pushed into the powder tray from the end. This tray is very long. The charge is in two sections, the rear one inclosed in a brass cartridge case; the front section is much

shorter. Alongside of the tray was an enameled plate to show how they should be loaded. The long rear section was shown with a flange. The front section was shown with a becket. The powder part of the car has not two trays in it, but only one long one, in which the two sections of a single charge lie end to end.

When both shell and powder are loaded, the cable draws the shell car up to the magazine, and from then it lifts the powder car on top of it, so that the two cars come up to the working chamber like one. Naturally, this large square trunk takes up enormous amount of space between the guns, and prevents their being arranged close together.

In the rear of the guns are two large traveling frames or cars, into which powder and projectiles are loaded from the central hoist for traversing and loading into the gun. These loading cars are hydraulically operated, with controls located on a fixed platform in rear of them. It is possible, because of the great width of the turret, to use either loading car on either gun. If the right car breaks down, it can be removed well outboard in the turret, and the left car can handle the ammunition.

On the outboard side of each car is a frame to catch the ejected cartridge case. While the loading car is running over to the loading position, it carries the empty case well outboard on the frame. When the car is in the loading position the empty case is pushed to the rear down a trough, and through a spring door. For use when a car is working on the opposite gun there is a light detachable cartridge case frame which can be put in the other side of the car.

When the hoist runs up with a charge the loading car is traversed inboard from the gun until it is in line with it. Rammers located forward of the hoist push both projectile and powder back into the loading car. The loading car is then traversed until it is in line with the bore. There is a very neat little hydraulic telescopic rammer with five lengths about 40 inches long. The outboard section was of $3\frac{3}{4}$-inch diameter, and the next of 4-inch diameter. It was remarkably rigid. On the first ram the projectile is seated. When the rammer is clear the upper part of the loading car comes down with the powder so that both sections of the powder can be rammed in at once.

Auxiliary Loading Arrangements.

Powder can be brought in through a door in the barbette and in certain positions put in an open car, which runs up into the rear of the breech of the gun. The ordinary loading car must, in such a case, be cleared out of the way. There are places for eight projectiles in a rack in rear of the loading car, stowed horizontally and with points forward. There were flame-tight doors on the hoist, but in

general the turrets were by no means so flame tight as British turrets. Below decks there were no passing scuttles and nothing much could in any way compare with the rotary passing scuttle used in the British Navy. There was a light perforated plate up under the turret roof in the rear of the gun, and it was intended to investigate to see whether there was a sprinkler under it, but this was forgotten. There was much wood in the magazine, a fact also remarked in the examination of German ships in Germany.

It may possibly be argued that the inclosure of the charge in a copper tank may make the flame-tight precaution less necessary than with our own ammunition, but apparently the forward section of the charge is exposed, and that would seem to make conditions almost as dangerous as if both were.

Summing up, there seems to be very little to be learned in general loading arrangements from an examination of these turrets. The central location of the hoist is not so safe as where the break is on the next lower level, and it is believed that it is not so rapid. For two-stage hoists of this nature the British turrets, with the cage coming up in the rear of the gun, seems quite superior from every point of view, and our own new design also seems very superior to this. The possible advantage of this German design is the flexibility, which permits loading one gun with either car so readily. The strange mixture of electric and hydraulic gear is peculiar. The limited elevation of the guns is a great disadvantage. On each side of the deck lugs there is a brass bearing about 1 foot wide, and a similar bearing on the two sides of the slide to keep the guns from moving sideways. Possibly this is with the idea that they will be held steadier at the instant of firing. It will be endeavored to learn more about this. The guns can be cross-connected. There have been bad reports of German turrets jamming in action. Possibly the ball-bearing roller path gives greater efficiency, but does not stand up so well when the turret is hit. The details of what the lower ball race is supported by will have to be studied.

The sights (or what was left of them) worked very well, due to the fact that there is an arm carried on the trunnions, and the counterbalance spring on this balances the weight of the sight, which is considerable. It is as easy to run the sight up as to run it down. This feature appears even on the sights of the broadside guns. It is very good; though, because of the construction of our turret sights, it would not be quite so necessary with ours.

Recoil System.

The recoil system consists of one large cylinder below the gun and two smaller ones on the side. Machinists from Vickers and Armstrong and officers from the dockyard were mostly of the opinion that it was straight pneumatic, with a possibility of it being

hydropneumatic. There were apparently no connections betweeen the large lower cylinder and the upper ones, and all were provided with fittings, which looked like very high-pressure air fittings with joints such as are used in charging torpedoes. There was nothing connected to them, however, so that it looked as if the recoil system were filled by simply charging the cylinders separately from a flexible connection of some sort not present. The gage connected to the large lower cylinder ran to a manometer on top of the gun. This was graduated in atmospheres, and the name plate explained that 60 atmospheres was desirable and that 50 atmospheres was the lowest limit. The side cylinders did not seem to be large enough and were too heavy to be simply spring tubes. There was no way of measuring the length of recoil, but the gun was cylindrical for about 6 feet forward of the slide on top, and there was so much space in rear, due to the long loading tray, that the gun probably had a very long recoil. The recoil system will have to be broken down before it can be understood.

Breech Mechanism, etc.

Although the breech mechanism works so well, being provided with roller bearings, there are certain obvious disadvantages to the wedge mechanism. The yoke had to be forward of the wedge, and it was desired to keep the recoil cylinder as far in rear as possible. Because of this, two rods, running to the rear, and a cross-head arrangement for the recoil piston rod, were necessary. All the part of the gun in rear of the wedge is wasted length, increasing barbette diameter and turret-armor weights. In all cases the cylinders remained fixed in the slide and only the pistons moved, instead of the cylinders moving, as in British mounts. There were glass windows for the sight holes and some of the other openings. The range-finder holes had tin funnels quite narrow, but about 1 foot high, apparently to keep out spray.

Broadside Guns.

These guns were 15-centimeter guns of 835 meters per second initial velocity. They sighted up to 25°. The projectiles weighed $45\frac{3}{10}$ kilograms. The sights were cross-connected. The range dial read up to 165, which is probably 16,500 meters. At 8° elevation the range reading was 100. The sights were counterbalanced. The telescope holders show that the after part of the sight ran forward and that the sight then turned in closer to the gun, so that it could have a larger angle of train without being obscured. This was much like our own 5-inch sights, except that these German sights only run over close to the gun and do not slope down to get under it. Pointer and trainer had small seats of adjustable height. These were used in the turrets. They were simply tin plates and were not shaped to

make them comfortable. The elevating rack was on the left side of the slide, and there was no arrangement for taking up lost motion. In fact, nowhere on the whole ship was there any evidence of the antilost-motion devices so commonly used by us, which allows gears to mesh better and with less play by sliding certain portions of the teeth as compared with others. The guns were of Krupp manufacture, 1916. The recoil cylinder was on the top of the gun. There were shields around the guns much like our 5-inch, but everything was much tighter. There was a sort of vertical rubber roller on the edge of the port, touching the cylindrical gun shield, and intended to keep out water.

The casemates in which these guns were mounted were dark, due to the fact that practically every opening possible had been eliminated. The casemates were not large, and inboard of them on each side was a fore-and-aft bulkhead with quite a wide passageway inboard of it. The pedestal was light. It seemed much lighter than our 5-inch. The usual lamps in such places had the globes covered by a sort of box of blue glass with one-half-inch wire mesh on it. There were spring hinges at the top so that the halves of this box could be drawn around the lamp at will to make only blue light show, or else it could be drawn up and better illumination secured.

The openings in the shield were made tight with light plating in much the same way as turret port openings are made tight with armor plating of reduced thickness. The hoist motors were on deck on the top of the hoist instead of below decks.

Torpedo Tubes.

These were of about 23 inches diameter. The exact dimensions will have to be obtained later. They were pointed 15° forward of the beam. One was a little behind the other, so as not to interfere. There was stowage space for a couple of torpedoes on top of the tubes, and these would be traversed over to the side of the tube and then lowered and then put into the tube and the side door closed. Apparently a bar and not a spoon was used. This forward inclination of the tubes is most surprising, for in working out designs, assuming that the gyro will work properly, it seems that a tube inclined abaft the beam, rather than forward of it, would give the best success. The torpedo tubes were only seen for a minute and further information will have to be obtained.

Plotting Room.

There was a lot of water in the plotting room, and everything had been stripped out of it. It was very small and had the fire-control switchboards in two alcoves leading off from it. The arrangement was such that it seemed unlikely that there were any large tables.

The marks on the deck indicated rather that there were pedestals for plot instruments. To date it looks as if the Germans depended upon clock systems and the average of range finders practically to the exclusion of the graphical methods like the Mark II or the Drayer table.

Torpedo Control.

No torpedo-control station could be located, but there was a hole in the casemate armor, not far from the part of the ship where the torpedo tubes were, which looked as if it could be used for the torpedo director. In a deck above there was also a small hinged opening of some sort. The utilization of the casemate armor for the protection of the torpedo-control station would effect a saving in weight.

BEARDMORE-FARQUHAR MACHINE GUN.

Source: Reliable.

15 August 1919.

(12084.)

The gun is of the light machine-gun class, similar to the Lewis gun, and is intended to be used in the same way. The principal feature of the construction of the gun is that extensive use is made of spiral springs in spring tubes for the operating parts. Some trouble was experienced in manufacturing satisfactory ones, but the makers claim that these difficulties have been overcome. It is gas operated, but instead of the gas operating the parts directly the gas pressure works a piston and compresses a spring, and it is the spring regaining its former position which operates the gun. This is claimed to make the operation much less violent.

The feed mechanism was interesting in that the rotary magazine, something like that on the Lewis gun, holds two layers of cartridges, and it is proposed to modify it so that it will hold four. If there is any need for the enlargement of magazine on this type of gun useful ideas may be found in the magazine features of it.

The operating mechanism is not so likely to become overheated from a hot barrel as with other guns, as the connecting parts of the metal are of reduced section, and the heat by that means is somewhat confined to the barrel. There is no cooling mechanism. This, of course, simplifies and lightens the gun. It fired 640 rounds on a previous test with great rapidity and without jamming or being put out of action by overheating. The makers contend that this is enough for a gun of this nature, which is to be so differently used from a heavy machine gun. A number of sergeants of the Machine Gun Guards, who had been working the Lewis gun in France throughout the war and had first-hand experience in such matters, were of much the same opinion.

The supporting legs of the gun when they fold down under the barrel furnish something to catch hold of without burning the hand.

As regards the omission of the cooling device opinions may vary, and it was surprising to see the large number of those informed in such matters who were all for leaving cooling devices off. This, however, is a general question. It was possible to light a cigarette from the barrel after firing several magazines, but it had cooled off considerably three-quarters of an hour later.

The gun showed the tendency in firing to work off somewhat to the left. The kick did not appear to have been eliminated to any remarkable degree. It was by no means so well eliminated as in the Berthier gun.

The general consensus of opinion among those who witnessed the test was about as follows:

(*a*) The gun represented a not very far advanced development of a light gas-operated machine gun, specially characterized by the feature of having the gas operate against the spring through means of a piston instead of directly and using spiral springs quite extensively in the mechanism.

(*b*) The elimination of the cooling devices was interesting in suggesting that it might be quite feasible, and an improvement, under certain conditions of warfare, to have them eliminated. The magazine features are interesting if it becomes necessary to increase the size of magazines. The extractor features are good. The light underparts of the gun are liable to injury.

CAPTURED GERMAN ORDNANCE—MATÉRIEL.

Source: Reliable.

27 August 1919.

(197.)

The most interesting exhibit was a 15-inch German projectile which had been cut in two so that it showed in section. It had originally been 3.4 calibers long, but by means of a false ogival had been increased to about 5.6 calibers. This type of projectile was fired around Dunkirk. There were three rotating bands and one decoppering band of tin-lead alloy behind the last band. This band was about $\frac{5}{8}$ inch by $\frac{3}{8}$ inch, or perhaps slightly smaller. Another similar band analyzed showed 85 per cent lead and 15 per cent tin, and still another, from German stories, seems to be entirely lead. From this it is seen that decoppering bands are all compositions by no means standardized, and how much tin and how much lead to use is an open question with the Germans as well as with other services.

Rotating Bands on German Projectiles Seen in Woolwich Museum.

The German projectiles of most recent manufacture had the copper in the rotating bands cut down to an absolute minimum. The band scores were not carried straight across the bottom, but in the bottom of each band score a large lump of metal had been left, so that there was practically nothing except two separated grooves into which the edges of a sort of thin copper ribbon had been forced. This arrangement is quite common in German projectiles. This improvement, which looks good even outside of the economy of copper, can be studied from the French reports of captured German ammunition. In this collection of German ammunition, when the dates were examined, it could be seen that the tendency was to economize copper and to make very elongated false points on projectiles, quite commonly of conical rather than ogival form. More than one rotating band is the rule, but not an invariable one. Some, but in by no means all, of the newer projectiles had the after part for about half caliber from the base tapered in at an angle of 10° or 12°, like many French projectiles.

There was an 18-inch railway howitzer in one of the shops and a German 11-inch gun, dated 1904, used in the railway artillery and captured by the British Fourth Army.

INTERNATIONAL.

INTERNATIONAL NOTES.

Source: Reliable.

6 September 1919

Great Britain—Political.

Public attention continues to scrutinize all Government activities with a view to discovering extravagance. The results of the reports which Mr. Lloyd-George has requested from his ministers as to what steps they can take to curtail expenditures in their various departments are awaited with great interest.

In this connection the letters which Lord Fisher, First Lord of the Admiralty in 1914–15, has written to the London Times have aroused considerable comment. He demands a reduction of the present annual expenditure of the Navy, which is £140,000,000, and contrasts it with the £34,000,000 spent in 1904. In response to this and other criticisms, Walter Long, First Lord of the Admiralty, has announced that he will report to the Premier within a fortnight just how far he is prepared to go with the reduction of the fleet and of the Admiralty staff. It is anticipated that expenditures will be reduced to less than £70,000,000 by the cessation of new shipbuilding

and, in a smaller degree, by the reduction of the personnel of the fleet.

As a means of doing away with some of the discontent shown by large numbers of discharged soldiers, the Government has announced unofficially that a royal proclamation will be issued soon calling upon every employer holding Government contracts to have, as not less than 5 per cent of his employees at trade union wages, men who have suffered some disability in active service.

The removal of import restrictions on September 1 resulted in no little agitation on the part of the merchants of Great Britain. The appearance of German goods on the London market, together with German circulars sent broadcast and the prevailing low prices of the German merchandise, caused a natural feeling of alarm. It was expected that the National Union of British Manufacturers would protest to the Board of Trade. The argument that it is unpatriotic to buy German goods was answered, however, by those who claim that Germany's trade must be reestablished to enable her to pay her debts and by the fact that although nine out of ten British merchants may not buy German goods the tenth man will, and by his lower prices force the others to follow his example. The point of view of the Government was clearly expressed by Sir Auckland Geddes in a conference which he recently held with a deputation of toy makers. He asserted that the Government declined to adopt a policy of a three-year embargo on any imported goods, and he pointed out that Germany had only a small accumulation of manufactured goods ready for export and that the cost of manufacture was rising enormously on account of the shortage both of coal and of raw materials in that country. The minister believed that there was little to fear from such competition, and that Great Britain's trade would be benefited rather than injured by the purchase of such German goods as are available. In regard to the importation of goods from America, it is obvious that the exchange situation amounts practically to a 14 per cent duty, which in practice is a more formidable obstacle to trade than any tariff.

CONDITIONS IN TABASCO, MEXICO.

Source: Reliable.

24 July 1919.

(11950.)

Business and agricultural conditions have not improved and the revolutionary bands have gradually and persistently spread their fields of activity until the district is in a fair way to become isolated from the rest of the Republic and to lose all character of an integral part of Mexico.

The revolutionaries have control over the territory of the district outside of the principal towns and along the rivers—that is, they have visited at one time or another every section of the States with impunity, and while they have not attempted to hold permanently all of the area they were and still are able to demand tribute from all parts, and about half of the area of the district is controlled by them to an extent that makes it impossible for the Federal troops to visit such areas at all. Federal forces are confined to garrisons in such towns as Villahermosa, Frontera, Salto de Agua, Pichucalco, etc. Revolutionaries rarely attack these garrisons. Occasionally the Federals sally forth in pursuit of revolutionists who have passed within a few miles of the garrisons. The Federals have been very successful pursuing, but never at fighting. The revolutionists are mounted and live on horseback mostly, so they easily evade the Government forces and engage in battle only when they find it to their advantage to do so. It is the prevailing local opinion, based upon observation of past performances, that the revolutionists may take any of the towns if they care to attack them. One of the revolutionary leaders has explained that because of the difficulty of defending the towns and of maintaining their forces in the towns they would make no attempt to capture them until the "opportune moment."

It has long been a source of wonderment that the revolutionists have never undertaken to capture the numerous boats that navigate the rivers of the State. The rivers are the trade arteries of the State and district and provide the only means of transportation in the territory. The success of such attempts has been a foregone conclusion, as the Government has no war craft of any kind for protecting the river traffic. But until the end of May the revolutionists had contented themselves with firing upon troops being transported.

However, on the night of May 28, the steamer *Papantla* was attacked and robbed while navigating the Grijalva River between Villahermosa and Frontera. Villahermosa is the State capital and trading center. Frontera is the only trade outlet. The Grijalva River is the main highway of the district. A few weeks later the *Armandita*, an auxiliary schooner, was attacked in the same neighborhood and thoroughly sacked. Thereupon, as a measure of precaution, the customs authorities adopted a rule to prohibit travel at night. This meant the bunching of craft as they all were obliged to leave about the same hour of the morning on any journey and worked out to the advantage of the revolutionists. On July 16 five boats en route to Villahermosa from Frontera were attacked and robbed. They came one right after the other at just such convenient intervals as to enable the revolutionists to sack them all within a brief space of time and to get away. In addition to large quantities of

other loot, they seized a large consignment of saddles and munitions destined for use of Government troops in Villahermosa.

The effect of these raids can perhaps be better imagined than described. While the bands who have committed these depredations have thus far respected the lives of the crews and passengers of the sacked boats when they encountered no resistance, nevertheless the traveling public is, with good reason, well alarmed as to the safety of travel in the future. The authorities have now adopted the practice of placing armed guards upon the boats. The boats are for the most part small and can not accommodate a guard of sufficient force to beat off the bandits. Consequently they only serve to draw fire from the attackers. The merchants can get no insurance upon the money and merchandise they dispatch upon the boats, and in view of the heavy losses sustained by many of them, it is improbable that there will be much freight traffic as long as conditions remain unimproved. Therefore the interior is in a fair way to become isolated, and the port of Frontera, which relies upon shipping for maintenance, will naturally feel the effects. It may easily be understood how the feeling of general despondency grows.

Regarding the threat made by revolutionists to destroy the American-owned steamboat, *Sanchez Marmol*, the incidents just cited show how easy it would be for them to carry out their threat at any time. The *Sanchez Marmol* has been in dry dock for several weeks, but will soon take the water, and it remains to be seen if the revolutionists are intent upon carrying out their threat.

Movements of Revolutionists.

About the last of April the movements of a large force of revolutionists under command of "Gen." Fernando Villa (erroneously referred to as "Francisco" Villa) could be traced through eastern Tabasco and southern Chiapas in the general direction of British Honduras. On this raid large numbers of mules and horses were confiscated, and it is said that around 1,000 animals were carried away. In May this band returned to Tabasco greatly augmented in number. It is said that many idle *chicleros* (chicle tappers) of the Candalaria River region of Chiapas had joined their ranks. According to the testimony of eye witnesses—persons who had inadvertantly got into the path of the band on its return—they were equipped with new rifles and an abundance of ammunition. According to the statements of members of the band, the new rifles and the ammunition had been obtained in exchange for the horses and mules, which were sold in British Honduras or on the British Honduras border.

It was in April that Gen. Francisco Bertani assumed command of the Federal forces of the district. Gen. Bertani appears to be a conscientious, well-meaning man who has won the respect of the general

public by the consideration he and his officers have shown for the civilian population, which has been contrary to the usual policy of Army officers here. Gen. Bertani has had two major engagements with revolutionary forces since he came and his troops were defeated in each instance. He announced recently that he expected to leave shortly. He stated (to an American who cultivated his acquaintance) that he had had "enough" of the situation down here, that instead of cooperation of the State authorities (the Greene government) he encountered only interference, and he openly accuses the Greene officials of abetting the robbery of the river boats as described above. He bases this accusation upon the fact that the depredators have shown an accurate foreknowledge of the movements of various steamboats and of the exact contents of the money boxes carried on the boats in each instance. This knowledge, according to Gen. Bertani, presupposes the furnishing of the information in advance by officials before whom the contents of the express boxes and the freight must be declared before a vessel is allowed to leave any port, even though for intrastate traffic only.

In addition to the forces commanded directly by Bertani, there is another Federal force under the command of Gen. Maldonado who, as explained in previous reports, has been engaged in pursuing revolutionists for almost three years without having appreciably improved the situation. The following account of his latest military operation was furnished by two acquaintances of the writer, one an American, one of whom was with the Federal forces and one with the revolutionists as noncombatants. This serves accurately to illustrate the actual campaigns that have been carried on in this State. Gen. Maldonado has his headquarters at Salto de Agua, Chiapas, on the east bank of the Tulija River. About a month ago "Gen." Pineda, revolutionary chief, approached and occupied an American-owned ranch called "Agua Clara" which lies on the west bank of the Tulija, just a few miles above Salto. Pineda had about 300 men. Gen. Maldonado sent his force of 500 men up the river on his side, and the two belligerents engaged in a rifle duel across the river, which is narrow. No attempt was made by Maldonado to cross the river below and attack Pineda's flank. To attack from directly in front was difficult as Pineda's men were entrenched. Maldonado, after an all-day duel, lacking transport to supply his men food, withdrew his forces with 14 casualties. The American who was with Pineda says he lost two men. The Federals then remained in Salto and Pineda in Agua Clara. Meanwhile Maldonado telegraphed to Col. Lius P. Vidal (brother of the former military governor of Tabasco and at present candidate for governor of Chiapas) to come to his aid. Col. Vidal with some 150 men left Chinal and advanced

upon Agua Clara from the west. As a mountain range almost surrounds the ranch on the west Vidal's men were forced to make a long circuit to reach the pass. Pineda's scouts advised him of Vidal's advance, so Pineda withdrew over a little-known mountain trail, cutting in behind Vidal's line of march. Pineda left a small guard at Agua Clara, presumably as a decoy. Vidal surprised this guard, so he thought, and the guard surrendered. However, Vidal ordered his men to fire upon them, and 11 of the 17 were killed after they surrendered. Vidal thereupon sent to Mexico greatly exagerated reports of his success in dispersing the revolutionists and started to return to his headquarters in Chinal. Pineda ambushed him on his return, completely dispersing those of his troops who were not killed or captured, and Col. Vidal arrived in Chinal half dead from exhaustion and alone. This description corresponds to most of those gathered about the campaigns carried on here.

Civilians do not hesitate to assert that the Federal officers for the most part have no desire to see the end of these campaigns, because they are a source of profit to said officers by padding pay rolls, by requisitions for allowances to purchase and pasture horses and mules, which are stolen and pastured without cost, and by selling munitions to the revolutionaries. It is believed, however, that Gen. Francisco Bertani is, if possible, an exception to this rule.

Local Complications.

The appointment of Gen. Luis F. Dominguez, the unsuccessful contestant for the office of governor of Tabasco, as commander of the garrison at Vera Cruz seems to set at rest, for the present at least, the apprehension on the part of the Greene partisans that there would be any Federal intervention on behalf of Dominguez. But a more serious complication arose when Gen. Dominguez's son, Col. Leonidas Dominguez, arrived here about two weeks ago to take command of his old regiment at Villahermosa. Already there had been minor disturbances between the troops of the Dominguez command who had been left at Villahermosa and those of the Greene command, also in the capital. Gen. Bertani, commanding both factions, appears to have endeavored to maintain order and discipline among them. But it has already been shown how Gen. Bertani developed a feeling of antagonism toward the Greene faction, which is the civil Government faction. The two weekly newspapers in Villahermosa commented upon the arrival of Col. Dominguez with abundant criticism and abuse, and Bertani thereupon arrested both editors for seditious utterances in criticizing the military. One editor was a member of the State legislature, and this aroused bitter feeling. Col. Dominguez had gone with his regiment to Teapa, but when he learned of the feeling that had been aroused by Bertani's

action he returned to Villahermosa to support Bertani in case of difficulty. There is a force of *voluntarios* in Villahermosa organized and armed by the Government for home defense. It is said Bertani will disarm all of these *voluntarios*. Once more there is a general exodus of frightened inhabitants, this time principally from the city of Villahermosa. Conditions are ripe for internal disorder in Villahermosa, and the alarm has become aggravated. Meanwhile prices rise, the business panic grows worse, and mendicants grow more numerous.

Probably the sentiments of the civilian population of Tabasco are represented by the statement made recently by a business man who said in effect: "Tabascans have always been a peace-loving, agricultural people. I do not know what great sin they have committed that they should be so punished, but for five years calamity after calamity has assailed us." Indeed, the plight of the people merits sympathy.

It is interesting to note that the recent "Juarez incident" caused hardly a ripple of excitement here and no demonstrations of displeasure. The hope is expressed by many that a similar raid might extend to Tabasco and establish peace down here.

The Greene State government has definitely aligned itself with Gen. A. Obregon as candidate for President of the Republic, notwithstanding the provisions of the new constitution adopted by this same government, which absolutely prohibits any officials from taking any interest in election propaganda or in the election of any particular candidate. The support of the State administration at the time of election guarantees favorable returns for Obregon.

TURKEY.

Source: Reliable.

2 September 1919.

Turkey—Political.

Under date of August 17 it is reported that the Turkish political situation remained ominous. Nazim Pasha, minister of war, has resigned and been replaced by Mustapha Chefik Pasha. Tevfik Pasha, ex-grand vizier and minister without portfolio, has also resigned.

The Turkish press has devoted some space to an editorial alleged to have appeared in the *London Morning Post* advocating a British mandate over the entire Ottoman Empire from Constantinople to the Persian Gulf.

The American Mandate Commission had about completed its hearings at Constantinople and expected to start for Paris on August 22. The Turkish press has given much publicity to the activities of this

commission, and its attitude has on the whole been favorable. In the *Vakit* for August 1 there was an editorial strongly urging upon the Turks the necessity for reaching a settlement of the Armenian question and pointing out how a too stubbborn policy in the past with respect to the Cretan and similar questions had proved very injurious to the Turkish Government.

The Crane-King Commission left the impression of having made an earnest, impartial, and intelligent effort to ascertain the views of all classes with regard to the future of Turkey.

There is continued pro-British propaganda in governmental circles, the Sabah having published an editorial which welcomes the Anglo-Persian agreement, and expresses the opinion that with British help Persia will take front rank among the Moslem powers. It asks whether the Turks can not regain the good will of the British and thus advance Turkish interests. The London Times correspondent has, however, reported that while some of these expressions are genuine they are for the greater part probably exhibitions of oriental guile, masking more or less violent ill will, and are no pledges of permanent submission.

The British appear to have taken a positive stand against the nationalist movement under Mustafa Kemal, which is undoubtedly identical with the program of the Young Turks, whose organization is still very strong, especially outside of Constantinople.

Allied Commission at Smyrna.

Admiral Bristol has gone to Smyrna as the American member of the Allied Commission appointed to investigate the incidents accompanying the Greek occupation of that region and to examine into the best methods to be followed in order to avoid further conflicts between the Turks and the Greeks.

RUSSIAN CONDITIONS—ODESSA.

Source: Reliable.

20 August 1919.

(11426.)

When the bolsheviks took Odessa, they began a reign of terror against the bourgeoise and imposed on them a cash contribution of 500,000,000 rubles. They confiscated all personal bank accounts. If any one did not contribute his share of the assessment laid, he was imprisoned or put to work cleaning the streets, etc. All kinds of oppressive procedure were used against the judges in public courts.

The bolsheviks executed by shooting hundreds of people including children and women. As an example, the son of Prince Radziwil, a

boy of 9 years old, was killed, thus hoping to put an end to the family. Some people have escaped from Odessa in small boats at night, thus reaching ships at sea belonging to the French or Greeks.

The laborers were at first enthusiastic in their reception of the bolsheviks, as they thought it would diminish the cost of living, but their expectation was erroneous, as bread has risen from a former price of 12 rubles a pound to 100 rubles a pound, and wood has risen from a price of 18 rubles a pound to 120 rubles a pound.

The villages in the neighborhood are opposed to the bolsheviks and they will not send their products into Odessa, and they are hoarding up what they can save. As a result, oil, fuel, and bread are very scarce in Odessa. Very little work is done by the railroads. The water supply of the city is imperiled. The water comes 50 miles away from Belchawka. The authorities are seizing the woods in the famous Estokade and the piles of the quays for the pumping station of the city.

Living conditions are continually becoming worse and there is an increasing opposition to the rule of bolsheviks. The workmen have become disaffected owing to mobilization, and the authorities have disarmed many of the railroad workers who were formerly bolsheviks. The peasants are opposed to the bolshevik communists, as already mentioned above, and recently in the villages near the city it is reported insurrections have taken place.

The peasants are prevented from capturing Odessa by the fact that they are without ammunition and organization. The soviet of Kieff is governing the city. In Odessa, Gregorieff has not become known. Among the chief commissioners have been Lieut. Sadoul, who came here with the French, and a Roumanian or Hungarian named Radowsky. I have been told by Thomas Whitemore that a year ago last spring he had seen Col. Raymond Robbins and Lieut. Sadoul constantly together in Moscow. However, Sadoul and Radowsky are reported to have quit the city leaving it in the hands only of commissioners of a lower degree, who include among their number the head of a band of robbers known as "Micheal the Japanese." Daily executions and robberies are occurring in numbers from 20 to 200. Within a recent period Odessa bolsheviks made an exchange for 2,000 Russians from France of about 400 foreigners. As a result of this exchange, quite a number of bolshevik agents came out. There are some of them in Constantinople now who are operating their propaganda. The Red Terror, supported by a small group of the Red Army, Georgians, Chinese, and Letts, wields the power in Odessa. The city can be taken by 1,000 determined men properly armed.

CONDITIONS IN RUSSIA.

Source: Reliable.

20 August 1919.

(11523B.)

The Berlingsketidende just published an interview with Dr. Follmer Hanson, who has just reached this city coming from Russia. I summarize the interview as follows:

"In January, last, I went to Petrograd on a mission for the purpose of protecting as far as possible the interests of foreigners, procuring food for children, especially such as were convalescent, and for the purpose of helping political prisoners. My business lay with Skolfsky, an idealist and a lawyer. All the officials are not idealists, but still a soviet government needs classes which are educated. Inasmuch as there are no restaurants or hotels open, after these classes have sold their jewels and personal property they have either to starve or work. The shops are few. The estimate of the population is said to be about one-third of the population before the war. There is absolute prohibition against liquor. There is strong discipline and no drunkenness. People can walk through the streets quite as safely as in any other city in Europe. At night I often went abroad and was never molested. On account of the want of raw material and the failure of transportation, most factories were closed. The railway lines between Moscow and Petrograd are in good condition and there is a regular movement of trains, but in other parts of the country they are in bad condition and there is a great want of locomotives. I should be glad to go back, but at present the soviet government desires no connection with the world outside. As far as the future goes, I can not predict it, but it would seem that the bolsheviks continue as strong as ever."

The Berlingske also published an interview with Martigny, the head in Russia of the Red Cross of Denmark. I summarize it as follows:

"In Moscow the conditions are very similar to those reported for Petrograd, but there is more life. The theaters are open although the hotels are closed. During the recent arrest of foreigners, some 5,000 were put under arrest. Most of them are still in prison. The search of houses and the arrests did not surprise people. They are continually happening. It is the custom to search and arrest food speculators. There is very strong discipline and no plundering. Chincherin's right hand, Karakan, who really heads the department, inquired whether we had met with any discourtesies. I answered that there was nothing for us to complain of. There are now in Russia about 50 business people of foreign nationalities. The most

severe punishment is imposed on people engaged in a traffic in cocaine and on spies. While many people are put to death, there is no mutilation or torture."

RUSSIAN SOVIET NAVAL FORCES.

Source: Reliable.

11 August 1919.

(11520A.)

LAKE ONEGA FLOTILLA.

Morale of the Officers and Men.

Amongst nearly all of the officers, with the exception of two or three, there is a sincere desire to join the Allies. The difficulties which prevent such a plan is the watchfulness of the commissaries. Under these conditions they conduct themselves as officers according to their position, not with preference for bolshevik principles.

The chief officer of the flotilla is a very energetic and capable man. He is often called to Petrograd for secret meetings, which in reality are to do with the national defense. His influence is of great value, and his authority receives greater attention than that of the commissaries. Two officers who assist him and are pro-bolshevik are the commander of the gunboat *Silny* and the commander of the gunboat *Sergei*, Lelenine. Generally speaking, the morale of the men varies, the majority wishing for the early ending of hostilities. A quarter of them are strong communists, but there are a small number who are in sympathy with the bolsheviks' ideas, but the majority are against the bolsheviks. On several boats, *Zelonoff*, *August Blanqai*, *Sverdeff*, *Ooridzki*, and *Rosa Luxemburg*, the crews are civilians and the number of bolsheviks among them is small.

Projects.

About 27 June a secret meeting was held at Petrograd which discussed the question of placing cannon of 120 mm. to defend the ports of Lake Onega. The question was also discussed as to three or four torpedo boats to reinforce the Lake Onega flotilla. According to the information received the Bolsheviks are aware of the strength and position of the Allied flotilla. Their reports indicate 12 motor boats armed with machine guns and 37 mm. guns and are stationed at Medveja Gora. Two hydroplanes, one French and one Russian, and two submarines recently arrived will shortly be put to use. No action has been yet projected by the Bolsheviks but it was proposed on the 27th of June to send several armed boats to the bay Unitza with a view of bombarding the Allied positions.

THE RUSSIAN BALTIC FLEET UP TO 19 JULY 1919.

Source: Reliable.

(11520A.)

Morale of the Officers and Men of the Fleet.

Amongst the officers there is a noticeable lowering of morale, due to the insistent spreading of rumors that the All Red Command has not enough troops near Petrograd and that it did not have enough in the spring advance by Admiral Kolchak. They talk of means of joining the Allies. Some of the officers unknowingly to themselves became indoctrinated with Bolshevik ideas. The percentage of such is comparatively small and, seeing that there is no way out of it, become Bolshevik by actions. At the present time absolutely all the officers are mobilized and serve from the age of 18 to 50 or 60. Officers' schools are closed and the students are sent to the ships on active service (active fleet). Certainly they all expect to free themselves soon of Bolsheviks.

Amongst the officers there are some who expose all the plans and conversations. They serve as agents of the extraordinary commission for fighting against counter revolution. One should never tell all he knows. All on this account, prefer to undertake something hazardous and not to trust anyone with his plans. This has its good side, but at the same time places those who desire to quit the Bolsheviks in a perious situation.

Amongst the sailors a turn for the better is noticeable. They begin to feel a dislike to Bolshevik régime, and it is very probable that the ships will surrender regardless of the Bolsheviks.

In May last the commissar at Cronstadt was badly beaten. An order was given for wives and families of the sailors to evacuate the place in 24 hours. The allowance of baggage to be carried was very small. On the grounds of this the wives and sailors beat the commissar nearly to death.

RUSSIAN NOTES.

Source: Reliable.

27 August 1919.

(11523C.)

Fire broke out at Cronstadt on 13 August as a result of the air raid made by the British. In the fire considerable stores of food and the fuel reservation were destroyed. In the recent motor-boat raid on Cronstadt certain British officers and men were captured, and the bolsheviks are treating them as prisoners of war. Their present place

of imprisonment is Cronstadt, but they will be transferred to Petrograd at an early date.

They are making use for fuel purposes of the wooden street pavements. Troops are being moved by the bolsheviks to the front in Finland from the Pskof front.

JAPANESE NOTES.

Source: Reliable.

8 September 1919.

(3447.)

One of the greatest problems facing the Japanese when they entered Formosa was that of transportation. The rivers of Formosa are naturally short because of the comparative narrowness of the island, and they are rocky and swift because of the mountainous character, so that the waterways, that have meant so much to the Chinese, were not available to the Chinese or their successors in Formosa. As soon as Japan assumed control of the island and harbor at Keelung, the northern port nearest Japan was developed at an expense of some $3,000,000. This is a purely artificial harbor, but the Japanese have given it a minimum depth of 26 feet, with considerable greater depth in most parts of the harbor, so that the largest trans-Pacific liners find it possible to enter at any time.

From Keelung straight south the Japanese built a main trunk line terminating at Takoa. This gave adequate means of transportation for men and merchandise the entire length of the island; but the wealth of the new territory was not even then available, so the Japanese inaugurated a splendid system of territorial development. Push railways—that is, trackage carrying small trucks such as we use in factories, pushed or pulled by coolies—were used as feeders, extending well inland and up into the mountains. As traffic on these light railways grew they were removed and narrow-gauge steam railways replaced them, and these push railways were made feeders to the narrow-gauge railroads, so that the development of the interior of Formosa has been rapid under the Japanese administration.

The leading products of Formosa are, of course, tea and camphor. Both of these products are brought down from the hills over the trams and narrow-gauge roads and then to Keelung by the main trunk line. One of the chief sources of main wealth to the natives is the camphor, and to eliminate unfair dealing by both Chinese and Japanese with the natives the Government made camphor a monopoly and permits trade with the natives only through Government barter stores, thus assuring the savage certain, though not very generous, compensation for his merchandise and labor.

BOLSHEVIK PROPAGANDA IN JAPANESE ARMY.

Source: Reliable.

14 August 1919.

(11556.)

A certain Japanese military officer who has been in Siberia made the following statement to a reporter of the *Nichi-Nichi* (Japanese newspaper) upon arrival in Tokyo from Siberia:

"It is a well known fact that the Russian Bolsheviks are trying to circulate Bolshevik principles and ideals among the Japanese troops in Siberia. The Japanese military authorities in Siberia are trying to take every means to stop it, and when they detect a Russian trying to circulate Bolshevik ideals among the Japanese troops they reprimand him. These Japanese troops, however, seem to be quite free from influence of the Bolshevik ideals, recognizing them as dangerous for Japan. On the other hand, these Japanese soldiers in Siberia are being affected by the thoughts prevailing in the home land, which are rather dangerous."

SOUTH AMERICAN NOTES.

Source: Reliable.

7 August 1919.

CHILE.

The Leguia coup d'etat in Peru has been little commented on by the press, but it is stated that the serious-minded people of Chile consider it most unfortunate for Chilean interests, as a solution of the Tacna-Arica question had been hoped for, but it is generally understood in Chile that the de facto president of Peru has been decidedly hostile to that country and that prior to his departure from Europe some months ago he said openly that his one idea was to obtain the return of Tacna and Arica to Peru.

It is reported that the cause of the downfall of the former cabinet was Don Luis Clara Solar, minister of finance, who had held that position since November, 1918. He was opposed by the nitrate interests, who feared his plans of consolidation of the nitrate plants, the wine interests, who objected strongly to the laws proposed by him for the prevention of the sale of alcohol in the mining districts, and by the radical party for political reasons.

CZECHO-SLOVAKIA.

July 4th Celebration at Prague.

The Minister at Prague has forwarded an account of the celebration of July 4th at Prague, carried out in a manner most gratifying to the Americans who were there on that day. It was even necessary

to restrain in some cases the zeal of the local authorities in their desire to officially participate in the celebration. In an address by President Masaryk he said that the principles of American democracy will be the guiding policy of his Government and of his life. Both official and private utterances and actions revealed a strong admiration and friendship for the people and Government of the United States.

FRANCE.

Source: Reliable.

6 September 1919.

An indemnity of 1,000,000 francs for the murder of Sergeant Paul Mannheim, killed in the streets of Berlin in July, has been paid by Germany. The French Government has made a gift of this amount to the International Red Cross.

OPERATIONS.

SWEEPING OF NORTHERN BARRAGE.

Source: Reliable.

31 August 1919.

(11878C.)

Dans were dropped in the line of mines by sweepers as the mines were found, and eventually a line of dans 1,000 yards south of the line will extend for its entire length.

The eastern end found with taut wire gear is marked by a special mooring buoy.

The line of dans placed just north of R. Q. 1 will be left down for the guidance of the United States mine sweeping forces.

On the 18th and 19th there was no sweeping, but on the 20th, when, returning from relaying a line of dan buoys, one H. 2 and 23 American mines were swept up, seven exploded in the sweep and there were two countermines observed to the northward. The 23—Z mines swept up drifted over the American section, but were all accounted for during the following days. On the 22d, one H. 2 exploded in sweep and two more were swept up, as well as six American mines. Three exploded in sweep. On the 24th, 26 more American mines were accounted for.

The actual position of the western end of R. Q. 1 was found to be be 1.200 yards north of the charted position of Y. 86. The H. 2 mines were very few and far between, which renders the operation more difficult, as it will be necessary to extend the clearance to the northward until American lines are found to insure that the whole of it has been covered.

On 21st August, *P–24* destroyed 12 type 2 mines which had been swept up the day before, and seven of these twelve exploded.

On investigation it was found that every one of the seven mines which exploded had been struck with tracer bullets. This may be a coincidence, but it suggests the possibility of the tracer bullet being an effective mine-destroying agency.

The 6th, F. S. F. carried out a second 100 per cent search over the position of Q. 19 and Q. 20 and swept up and destroyed two H. 2 Mark 2 mines. They used a vertical depth at the kites of 20 fathoms. The southern mine of these two was found in water which had not previously been swept, but it is considered that it was dragged from Q. 20 by a vessel using drift nets.

A drifting mine floating entirely submerged except for the central horn was observed during the day and after much difficulty destroyed.

On the 18th, the two western miles of Q. 19 were skimmed, accounting for 10 mines, and on the 20th the western 7 miles yielded 40 mines.

Quite 60 per cent of these swept up floated with the top plate awash and even lower, making it very difficult to locate and sink them.

The realization of the seriousness of this matter led to the issue of a telegram to all bases and also of a mine-clearance memorandum to counteract as far as possible any accidents. These were sent out in the spring of this year.

The danger is dependent on the amount of loose mooring rope, which, if large, causes the safety gear to fail. Marine growth also affects the safety gear.

The fact that loose mooring rope occasionally remoors the mine in shoal water is a particularly serious matter, but these occasions are known to be very rare.

Another point that perhaps should be mentioned is that a small percentage of German mines have failed to release from their sinkers after laying (due to clogging of the dashpot gear). It is realized that in certain cases they might possibly clear and release. This appears, however, hardly worth consideration, as the clogging and rusting of the turntable and silting up of sinker must forbid release after a period of immersion.

The effect of bottom sweeping has received much consideration and experiment on this particular point.

A mine of this type encountered by the bottom sweep cants over and returns to the perpendicular. The sweep probably breaks one or more horns, but may not break all. The mine when on its sinker is not dangerous and can not explode, but it can become dangerous should it release with one intact horn. The breaking of more than

one horn, however, floods the mine and counteracts its power to release.

In the position where S. S. *Englewood* was mined no German mines have been laid for 18 months. Moreover the bottom sweeping carried out should have been sufficiently intensive to insure breaking of more than one horn. Some six months elapsed since any sweeping took place in this area.

In British clearance waters since the armistice the losses of merchant ships which may be ascribed to the waterlogged mines are two, both of these ships being in unmined waters.

No losses by moored mine in approved traffic routes have been reported to date.

Thus it seems most probable that S. S. *Englewood* struck a waterlogged and submerged drifting mine with inoperative safety gear, which passed under the ship and did not break a horn until under No. 1 hold. The case appears to be similar to that of H. M. S. *Cottesmore*. Similar cases may occur until all moored mines are cleared up and also until sufficient time has elapsed for any drifting mines in this condition to obtain negative buoyancy and sink, but the small percentage of accidents to date does not merit stress being laid on a danger which might be easily exaggerated to the extent of affecting insurance rates and the morale of sea-borne passengers.

CLEARANCE OF NORTHERN BARRAGE—U. S. SECTION.

Source: Reliable.

1 August 1919.

(118878B.)

Mines Accounted for, 2,240.

The third sweeping expedition left Kirkwall on 5 June, and consisted of three divisions, each comprising six sweepers, three subchasers, and three trawlers. The whole operation was not completed until 1 July, the ships being absent from their base for 26½ days. Nine whole and four half days were lost by bad weather.

The field consisted originally of 5,520 mines, 320 of which exploded on laying; 2,240 were swept up and these, with some previously destroyed by the British and U. S. S. *Patapsco* and *Patuxent*, give a percentage of 42.14 of those laid.

The upper level mines still in place are far less numerous than those at 160 and 240 feet. Estimates have varied from 10 to 30 per cent. In sweeping the northern lines of deep mines longitudinally, it was ascertained fairly accurately that 54 per cent of the mines in that line were in place.

Assuming that all middles and lowers have an equal chance of survival and that the percentage of 54 holds good, it will be seen that about 18 per cent of uppers remain in place.

Another factor that must be taken into account is that the vessels which follow the sweepers to sink mines that are cut loose only saw the floats of 16 uppers.

Therefore, out of the 1,840 upper level mines originally planted, it may be said that only 16 have remained in place, since without antennæ they would have little value at this particular depth.

During the sweeping a practical test was carried out to determine whether the obvious theoretical advantage of longitudinal sweeping over transverse sweeping would be borne out in practice. The commander of mine force, from actual experience, concludes that the longitudinal method gave results which were clearer, quicker, and safer.

MINE CLEARANCE IN THE ÆGEAN SEA.

Source: Reliable.

31 August 1919.

(11878C.)

MINES ACCOUNTED FOR:

Moored	1,010
Drifting	69

An analysis of the moored mines swept up during the month of July:

N. S	256
B. E	213
H. 2	70
Carbonit	31
Breguet	424
Harle	7
Total	1,001

In addition, there were 9 explosions on the bottom.

Remarks on Operations in the Approaches to the Dardanelles.

The first-line sweeping took place on the 27th of April, whilst the last line was swept on the 22d of July; during this period 2,495 mines were accounted for. The full list showing how many mines are believed to have survived in each line can not be completed owing to the clearance sweeping still in progress.

The time taken to sweep this area has worked out to approximately the date which was estimated when sweeping commenced, which was given at that time as the first week in August.

At times the rate of sweeping increased so rapidly as to raise hopes that completion might take place several weeks ahead of scheduled time, but these hopes were not realized due to bad weather, destruction of balloons during thunderstorms, and shortage of sweeping craft (this only applied to the first six weeks).

During the above 13 weeks, nine balloons were supplied to the mine clearance force by No. 11 Kite Balloon Base. Some balloons

made as many as three patrols, raising the total number of patrols supplied up to 14, of which one balloon was not used on the Dardanelles mine field, but was taken down to the Asia Minor coast.

Of the nine balloons supplied, four were returned flying, two were returned deflated (one of which was damaged), while three were destroyed by lightning.

Total time flown was 2,177 hours, making an average of 167½ hours for each patrol, while the actual time that observers were up in balloons over the mine fields was 658½ hours.

Remarks on Operations off Smyrna.

The Turkish tug *Nusrat* and two Turkish motor boats have been working in the Gulf of Smyrna during the month, during which time they have removed something over 42 sinkers and in three cases found the mine resting on their sinkers. This is believed to have been caused not by any defect in the original construction of the mine, but by the handling of the mines by the Turks before being laid. It had been anticipated that some of the mines would be found resting on their sinkers, and it was for this reason that the Turkish craft were sent to lift the sinkers. Details have not been received up to date showing what held these mines on the sinkers, but information will be obtained and included in next month's report.

Remarks on Operations off Bulgarian Coast.

Operations were commenced off Enos on July 24. No mines have yet been located in this mine field, although not less than 26 are expected to be found with a possibility of 35 being there. The water is not clear enough (from Enos River) to permit the use of kite balloons.

Operations have been commenced off Cape Makri and off Marona, resulting in 14 mines being swept up. A kite balloon was used successfully for three days, but it was then destroyed by fire during a thunderstorm. It is noteworthy that balloon did not appear to be actually struck but suddenly caught fire. On a previous occasion at Kephalo a balloon had been observed with a brush discharge of electricity all over its upper surface, and it is presumed that it is this discharge which occasionally ignites the leaking gas instead of a flash of lightning.

During period of 10 days off the Bulgarian coast five distinct thunderstorms on separate days were encountered, two of them being exceptionally severe.

Notes from Operations Report of Kite Balloon Base, 22 June, 1919.

The loss of H. M. S. *Kinross* on line N. 3 was witnessed from the balloon, and during the same afternoon the effect of the explosion on the line of mines was observed.

From the 7th–20th June, *M. M. 136* located and buoyed 15 lines of mines.

On one occasion during the operations great difficulty was experienced in landing from an airship attached to an M. L., and it was thought advisable to instruct observers when flying from an M. L. or "sardine" boat to descend as soon as wind speed reached or exceeded 15 miles per hour.

This was not meant to convey that the use of M. L.'s or "sardine" boats was condemned entirely, but that their use should be confined to cases of necessity only, such as absence of paddle sweepers or other suitable balloon ships for navigating over shallow mines. If the rule of disembarking observers at a wind speed of 15 knots or more, or upon signs of approaching lightning is followed, no undue risks should be incurred.

During period June 22 to July 2, 13 lines were seen and buoyed by *H. M. 245* attached to the *Duchess of Norfolk*. This entailed the balloon flying 250 hours in ballast and 68½ hours with passengers.

On June 28 *M. M. 247* at 12.30, while working on line N. 3 the *Duchess of Richmond* struck a mine and took a heavy list. The K. B. winch being damaged, the balloon could not be hauled down. The ship sank two hours later, the balloon still flying with observers. It was, therefore, valved to the water and the observers were taken off in a boat, whereupon it rose to 300 feet and was transferred to a drifter and conveyed back to base.

One rating was injured.

The value of balloon work has been well demonstrated by the Aegean clearance; visibility, if good, appears to admit of not only clearly seeing the line of mines, but also of discriminating to some extent as to their respective depths.

The position of the sun is of great importance to the observer's visibility.

Experiments under the different conditions of water are very desirable, particularly in regard to fine weather-climates abroad or here. "Oropesa" sweep, in conjunction with balloon work, would, if satisfactory, be the means of reducing material and personnel required for local defense mine sweeping.

DESTRUCTION OF GERMAN SUBMARINES IN VICINITY OF NORTHERN BARRAGE.

Source: Reliable.

12 August 1919.

(9842.)

(The following information in regard to the Northern Barrage is published.)

"Your 401 location was 59° 16′ 30″ latitude, 1° 31′ 30″ W. Sea was calm. At times slick appeared. Estimates of size of slick vary from 500 yards to 1 mile in diameter."

In reply to inquiry the admiralty states that by their records this is the wreck of the *U. B. 127*, presumed to have been sunk by a mine on the 9th of September, 1918.

> "Received radio report from sweepers on mine field that while sweeping large deposits of oil were observed to come to surface in latitude 59° 20′ 30″ N., longitude 0° 55′ E. Three sweep wires are also reported to have parted in one spot, latitude 59° 21′ N., longitude 0° 58′ E. Presumably the above was caused by German submarines."

In reply to inquiry the admiralty states that they can not definitely say which submarine this is, but think it may be the *U–102*, which was lost in the second half of September, 1918.

139756—19——5

TRANSPORTATION OF TROOPS.

Source: Commander Cruiser and Transport Force.

	Carried by United States naval transports.	Number of United States naval transports sailed.	Carried by British ships.	Number of British ships sailed.	Carried by British-leased Italian ships.	Number of British-leased Italian ships sailed.	Carried by other United States ships.	Number of other United States ships sailed.	Carried by other ships (French, Italian, etc.).	Number of other ships sailed (French, Italian, etc.).	Total United States troops transported.	Total ships sailed.	Percentage carried by United States naval transports.	Percentage carried by British ships.	Percentage carried by British-leased Italian ships.	Percentage carried by other United States ships.	Percentage carried by other ships.	Under United States naval escort.	Under British naval escort.	Under French naval escort.	Percentage under United States naval escort.	Percentage under British naval escort.	Percentage under French naval escort.
1917.																							
May	1,035	3	508	2	0	0	0	0	0	0	1,543	5	67	33	0	0	0	258	1,285	0	17	83	0
June	8,855	9	1,080	1	0	0	5,156	8	0	0	15,091	18	59	6½	0	34½	0	15,032	59	0	99	1	0
July	5,281	8	7,299	6	0	0	0	0	296	1	12,876	15	41	57	0	0	2	10,063	2,566	247	78½	20	1½
August	4,310	6	11,890	7	0	0	1,109	2	2,094	2	19,403	17	22	61	0	6	11	12,259	4,129	3,015	63	21	16
September	13,917	15	19,671	12	0	0	0	0	0	0	33,588	27	41	59	0	0	0	17,432	12,898	3,258	51½	39	9½
October	25,098	14	13,013	9	0	0	0	0	1,916	1	40,027	24	62½	32½	0	0	5	36,893	3,134	0	92½	7½	0
November	9,988	9	10,669	7	0	0	1,235	2	1,830	1	23,722	19	41½	46	0	4½	8¼	13,246	10,476	0	56½	43½	0
December	37,445	16	11,370	9	0	0	0	0	0	0	48,815	25	77	23	0	0	0	42,783	6,032	0	87½	12½	0
1918.																							
January	25,662	16	20,514	9	0	0	0	0	1,879	1	48,055	26	53	42½	0	0	4½	35,827	12,228	0	75	25	0
February	39,977	17	9,259	4	0	0	0	0	3	1	49,239	22	81½	18½	0	0	0	48,795	444	0	99	1	0
March	56,278	26	27,626	14	0	0	1	1	1,895	4	85,710	45	65	33	0	0	2	73,095	12,615	0	85	15	0
April	67,553	27	47,362	20	2,626	2	737	11	1,794	3	120,072	63	56	39½	2	1	1½	91,308	28,764	0	75½	24½	0
May	96,273	33	133,795	75	12,127	6	3,288	22	2,231	5	247,714	141	39	53½	5	1½	1	220,463	26,652	599	88½	11	½
June	115,256	36	140,172	70	14,465	7	6,003	11	4,538	4	280,434	128	41¼	50	5	2¼	1½	244,631	30,912	4,891	87½	11	1½
July	108,445	33	175,526	89	11,502	7	4,020	13	11,866	5	311,359	147	35	56½	3½	1	4	258,332	46,329	6,698	83	15	2
August	116,401	36	137,745	74	9,376	6	8,495	15	14,358	9	286,375	140	41	48	3	3	5	237,920	22,572	25,883	83	8	9
September	107,025	35	134,576	69	7,052	4	5,511	18	5,506	3	259,670	120	41	52	3	2	2	224,298	20,681	14,691	86	8	6
October	72,092	43	94,214	57	11,098	7	4,709	17	1,950	3	184,063	127	39	51	6	3	1	130,274	51,454	2,335	70½	28½	1
To Nov. 11	1,191	9	10,698	12	0	0	235	3	0	0	12,124	24	10	88	0	2	0	7,451	4,673	0	61¾	38¼	0
Total	912,082	391	1,006,987	546	68,246	39	40,499	123	52,066	43	2,079,880	1,142	43¾	48¼	3	2½	2½	1,720,360	297,903	61,617	82¾	14⅛	3⅛

CONSTRUCTION AND REPAIR.

NOTES AND GENERAL COMPARISONS OF SUBMARINES, WITH A FEW OUTSTANDING FEATURES.

Source: Reliable.

December 1918.

(12101.)

Italian Submarines.

Light plating and light scantlings. Mostly small boats from 40 to 500 tons. Latest types, 800 to 900 tons. Older boats mostly Laurenti design. Latest show departures and improvements, especially to reduce diving time, accomplished by larger kingstons, more of them, and by keeping tank tops lower. Their submarines built for Adriatic mostly; not suitable for long cruises. Much space given up for officers—not much attention paid to crew's quarters.

Tendency is to control from C. R.

Electrically controlled auxiliaries.

Periscopes poor to good. Mostly one power. Latest have two power and altiscope feature.

Engines good—have had much trouble.

Latest Ansalda and Toza engines (two cycle) give test stand promises of being great improvements.

Hulls rather lightly constructed and not intended for great depth. Have had trouble from lack of strength, especially where they departed from circular section of I. H.

Little regard paid to excrescences on hull.

Not very well arranged.

Batteries not symmetrically arranged and locations various.

Armament not of the strongest or best.

Fixed guns now standard, but many other types.

They claim fairly high submerged speed, but doubt if it is actually obtained.

Boats much under overhaul and do not do very much seagoing; they apparently do little training or operating.

French Submarines.

Many experimental types.

Steam installation considered a failure.

Not particularly keen on keeping the sea, especially in bad weather.

Many engine troubles and difficulties.

Latest Schneider engines (two cycle), show excellent test stand results. Four-cycle engines, also built by Schneider.

Electrically controlled auxiliaries.

Time of diving decreased by more or larger kingstons. Boats handle well under water.

They claim high submerged speed, 11 to 11½ knots, but it appears doubtful if this is maintained for 1 to 1½ or even 1 hour, as claimed.

Tendency is to control from C. R.

Periscope fair to good. One power (low) only. Two power and altiscope feature not yet out of design stage; in production at Carpantier and S. O. M. H. P., but not in boats.

Armament—deck torpedo tubes mostly, but being abandoned for internal tubes. Fixed gun mounts now standard, but many other types.

Hulls—generally light plating and scantlings. Not designed for or tested to great depths.

No serious attention given to excrescences.

No bridge shields, but being installed now.

Generally follow Lauboeuf design, but many departures in recent designs. Two schools of designers. Operators claim one is good, the other poor.

Boats much of their time under repair and overhaul.

They carry out many drills and considerable training, but not much keeping to sea in bad weather.

Boats very much given up to quarters for officers and chief petty officers; batteries not accessible. Tendency is to adopt 800–900 ton boat as a standard.

German Submarines.

Germania-Krupp design. Practically all double-hull boats—all latest are.

Three standard types, U. C., U. B., and U.

Special types.—U. A.—135–138 class and 140 class. U. E.—mine-laying cruisers. U. C. and U. B. types.—merged as to size in latest boats. U. C. are mine layers; mines forward in wells through inner hull.

Outstanding features:

(*a*) Double hull protection.

(*b*) Engines—probably best in the world.

(*c*) Great radius of action.

(*d*) Periscope—very good to excellent. Lengths in no case exceed 24 feet. Three in U boats and larger types; also special types. Bifocal 1.5 and 6 power. Altiscope feature in many.

Conning tower control.

Complete double system (supply and exhaust) ventilation.

No broadside tubes. One or two stern tubes.

Very large heavy conning towers of nickel steel when nickel is available.

B. H. doors in pressure B. H. are round and very strong.

Double-hull affords much protection from damage, especially by depth charges.

Hull strongly built but very wide frame spacing. Heavy concave-convex pressure bulkheads in U, U. E., and U. B. types. Latest U. B. have C. R. fitted with pressure B. H.'s.

Bulkheads penetrated by myriads of leads of all kinds.

Elaborate ventilation and cross connections.

Elaborate air-purifying installations. Altogether too elaborate.

Auxiliaries—all electrically driven.

"Drowned" bow hydroplanes except in U 140 class.

Chariot bridges fitted in all types.

Only one hatch in U. C. conning towner—an element of weakness.

Boats are crowded, congested, complicated, and filled with "gadgets" of all kinds.

Much space given up to officers' quarters and chief petty officers; not much space or comfort for crews.

Batteries are inaccessible except in U. E. and U. A. classes.

Bow net cutters on nearly all. Stern net cutters on some.

Folding wireless masts—heavy, awkward, and cumbersome installation.

Many emergency leads and connections of all kinds.

Superstructure deck fitted with a superabundance of ammunition lockers.

Many gun emplacements (two to four) but usually only one gun mounted except in cruisers and *Deutschland* class. Armament—strongest and best known to the German service.

Time of diving reduced by "twin kingstons."

Kingston-valve control scattered throughout the boat.

Tank controlled by vent domes and their valves controlled by shafting led into C. R.

Control of boat in all its operations is divided between C. T. and C. R.

Navigation, torpedoes, etc., controlled from C. T. Diving, tanks, etc., controlled from C. R.

Boats are not well designed as to exterior of hull, so far as speed is concerned, either surface or submerged.

With the horsepower the engines give, greater speeds should and could be obtained.

Little attention paid to hull excrescences.

Submerged speed considered of minor importance.

No effort made to insulate auxiliaries.

Apparently little effort made to eliminate noise of auxiliaries.

All periscopes motor-operated. House in steel tubes which extend to keel in some cases. Housing distances 12 feet to 14 feet. After periscope houses in a steel tube or well large enough to take a platform and man up and down.

Other periscopes only usuable at full extension.

Third periscope offset from C. L. with eyepieces in C. R. houses in steel tube, etc., forward and to starboard of C. T. Usually have a large heavy fairwater casting. Very rugged and heavy. Head sections of all periscopes very small, some going down to 1 inch; the latter not believed to be satisfactory. Reported unsatisfactory.

Ten foot horizontal base range finder in cruisers.

Special periscope attachment permitting fixed seat in C. T., and yet see through at all heights, thus doing away with platform. This is only on a few of latest boats.

Only one anchor is fitted—deck anchor—except in early U. C.'s, where mushroom anchor is used.

Galley is electric; electric cookers used, not electric range.

Air bottles—mostly stowed in superstructure.

Preponderance of numbers of boats—U. and U. B.

U. E. and U. A. are experimental; the latter classes are heavy rollers and lack stability. Boat for boat, I consider the *L–50* class of the British design the equal if not the superior of the U boat. If the engines of the two were traded, the British boat would completely outclass the German boat. The British boats are better designs so far as design of submarines is concerned. The horsepower of the U-boat engine is greater per cylinder than any other known design. For fleet purposes the British K class are superior to the U. A.'s, especially considering Great Britain and Germany as opponents.

It is quite apparent that the trend of the German submarine construction was to give the United States Army a thorough taste of "frightfulness" in the spring of 1919.

British Submarines.

Many classes and many types, some of which are experimental or special for special service.

Have had no hesitancy during last four years to try anything that promised good results.

Have standardized in 3 classes:

(*a*) Modified H class (enlarged E. B. H. boat).

(*b*) Fleet submarines K class—steam.

(*c*) L class and L-50 class—modified and improved E's.

By far the greater number built and building are of the L class (850–950 tons).

Designs are mostly Admiralty production with much assistance from Vickers and some from Armstrong. This is true only of last 5 years, before which Vickers did most of the designs. No special designer is followed.

Time of diving being reduced by enlarging Kingstons and by fitting "scoops."

Their boats have kept abreast of and ahead of the procession right along in most of the essential features.

All usual designs are "saddle tank" boats; K class double hull. R class single hull—simply E. B. H boat designs, stripped externally as far as possible to get high submerged speed.

Mine layers have mine tubes in saddle tank. M class are special; about size of K class, but have Diesel engines and one 12-inch 40-caliber gun. Worthy of serious consideration.

Engines standardized, Vickers's design, solid injection, 100 horsepower per cylinder. Good engines but deficient in horsepower when compared with latest designs and German installations. Periscope good to excellent and improving all the time. They run to very great lengths—30 to 36 feet, bifocal and altiscope. One night periscope. Not very highly considered.

Control from C. R. only. C. T. is small.

Hull strongly and heavily built, but only one boat of a class is tested by deep submergence test.

Trials very much curtailed and abbreviated.

Most of trial data taken by commanding officer and crew.

Speed data not very reliable or assuredly accurate.

Stream line sections. Model basin designs.

Much attention given to eliminating hull excrescences. All necessary hull fittings are portable or capable of being housed.

Every conceivable type of bow hydroplanes fitted. Tendency is toward "drowned" planes, but speed, both surface and submerged, is reduced by so fitting.

After planes and propellers more deeply immersed than in E. B. designs.

Electric installation noticeable by their absence to a large degree.

Auxiliaries operated as far as practicable by telemotor system (Williams Janney or Hele-Shaw).

Control of all essential features of boat from C. R. This is one of the outstanding features.

Much thought and care given to W. T. integrity.

Armament strongest and best known to the service.

Many broadside-tube installations, but stern tubes have been given up in recent boats.

No external torpedo tubes are fitted.

Fixed gun mounts. Installations getting higher and higher above W. L.

Much space given up to officers' quarters, especially in latest types. Tendency is to overdo this feature, due to the extremely arduous service the British submarine service has seen. Not so much attention given to men, but they seem fairly well contented. Very large wireless room in C. R., that makes C. R. rather congested.

L–50 class represents latest idea of design and these boats compare most favorably with any other boats in existence.

There is a noticeable lack of "gadgets," such as hydrogen elimination, air purifiers, leak stoppers, rescue apparatus, etc. The boats impress you as having essentials, but no superfluous catering to public opinion or service individual ideas.

CONCRETE SHIPS.

Source: German Press.

10 July 1919.

(8514G.)

During the launching of a ship there are two periods at which the ship is subjected to an unusually heavy strain. As the ship glides stern foremost into the water, the cradle runners go beyond the end of the slipway, so that the ship hangs over. Now if the water is at a very low level, so that it does not give sufficient support to the after part of the ship, the latter breaks similar to a thin stick projecting over the edge of a table. In the further course of the launching the stern goes deeper into the water, the stern receiving more and more support. Finally the bow is only supported on the slipway by the foremost edge of the cradle; as the ship is now only supported fore and aft it breaks similar to a stick supported at both ends. Even in the case of normal ships these strains are very considerable, and an increase in weight intensifies them enormously. The dangers connected with the launching of concrete ships, which weigh more than 1½ times as much as steel ships, are much greater than is the case with the latter. For these reasons it has been decided in many cases to launch the concrete ships broadside on, or even to build them in dry-docks.

MISCELLANEOUS.

WATER SUPPLY AT GIBRALTAR, SPAIN.

Source: Reliable.

31 July 1919.

(12075.)

The water supply for the territory of Gibraltar is of three kinds—namely, rain water for drinking purposes, brackish water for street

flushing and general sanitary uses, and well water supplied to the shipping for boiler use.

The rain water supplied to the town and the shipping for drinking purposes by the sanitary commissioners is collected on the catchment areas on the east and west sides of the upper part of the Rock. The quality of the drinking water supplied from the reservoirs has been excellent, and no chemical or mechanical treatment has been found necessary. No water has been issued which has not undergone a minimum of 15 days storage, and filtration is not made use of. Samples of water are submitted to frequent periodical bacteriological and chemical analyses.

The rainy season generally extends from October until the end of April, and during the remaining months rain very seldom falls. The average rainfall for the period extending from 1900 to 1918 was 31.40 inches; the highest rainfall being recorded between 1914 and 1915, when it was 57.81, and the lowest between 1917 and 1918, when it was 20.22 inches.

The aggregate storage capacity of the five reservoirs cut out in the interior of the Rock, which are owned and controlled by the sanitary commissioners, is 7,000,000 gallons, additional storage of 1,271,000 gallons being provided in a service reservoir. The military and naval authorities have separate catchments and water-storage reservoirs, but these are not large enough to meet their wants. The Admiralty have two small tank steamers which make daily trips for fresh water, to Tangier (Morocco) and Algeciras (Spain).

Owing to the great demand for fresh water, principally by the shipping, the sanitary commissioners are about to construct an additional 5,000,000-gallon reservoir in the interior of the Rock, the proposed dimensions being 1,000 by 40 by 20 feet, at an estimated cost of $250,000.

Rain water used for drinking purposes is also obtained from roof catchment areas by occupiers of dwelling houses and other buildings and stored by them in underground tanks.

In the year 1898 an area consisting of 14½ acres was prepared on the top of the northwest side of the Rock as a collecting ground by removing all trees, shrubs, and other vegetation and afterwards concreting the crevices. As new reservoirs were built it was found necessary to prepare an additional collecting area on the sand slope above Catalan Bay on the east side of the Rock. Ten acres of the sand slope were covered by galvanized-iron sheets laid on wooden frames, with a channel at the bottom from which a tunnel 700 feet in length was constructed. Through the tunnel the water flows by gravitation to the five reservoirs. The average yield of all the areas belonging to the sanitary commissioners is 376,000 gallons per inch of rain.

During the year 1918, 6,050,132 gallons of reservoir water were supplied to the public and 11,823,795 gallons to the dockyard and shipping, the difference between this amount and the rain water collected being due to some 2,000,000 gallons remaining in hand from the previous year. The amount of water collected from the sanitary commissioners' areas from the 1st of January to the 31st of December, 1918, was 15,470,864 gallons exclusive of 5,041,949 gallons run to waste in January and February owing to insufficient storage. It is estimated that the sales of fresh water to the shipping only for 1919 will be 4,500,000 gallons. The sanitary commissioners have placed no objection to drinking water from Algeciras, furnished by the Algeciras Water Company, being brought over for the shipping.

There are no restrictions regarding the quantity of water demanded by the inhabitants except whenever the rainfall has been below the average. In these cases fresh water is supplied in small quantities to the shipping and to reduce the local consumption the price of water is raised. On these occasions the calculated capita consumption is two gallons.

The water used for general purposes is pumped from the sea and from wells. These wells were sunk in the north front of the Rock and yield a supply of water amounting to 220,000,000 gallons per annum, pumped by triple expansion engines to a height of about 350 feet above sea level and delivered into large reservoirs, one at the north end and the other at the south end of the Rock. From the latter station the water is pumped to reservoirs for the supply of the inhabited districts situated at a greater elevation. The highest reservoir is 535 feet above sea level. From the reservoirs the water is distributed in mains to all the dwellings, etc., in the town and is used for cleansing, flushing, fire extinguishing, road and street watering, sewer flushing, etc.

Experiments have been made from time to time with the view of ascertaining whether water suitable for dietetic purposes could be obtained from wells, but in every case they have resulted in failure. On the north front deep borings were sunk but no water was found. Both public and private wells have been sunk in the red sand on the lower western slopes of the Rock, but although the yield was considerable it was found that the water contained a large quantity of solids and salts and in some cases organic impurities. Consequently the wells were filled up or concreted over in such a manner as to insure that the water could not be used.

In the year 1884 condensing machinery was erected capable of distilling 430,000 gallons of water per month.

The public supply then consisted of rain water collected near the Moorish castle, at the northwest end of the Rock, and the distilled

water supplied from condensers. With the average rainfall the collected rain water would last until the end of May. From then until the end of September the supply would depend upon the condensers.

All houses are furnished with this brackish water, and the quantities of water set forth in the following schedule are the minimum quantities of brackish water which shall be supplied by every owner or occupier of a house, building, or other premises:

SCHEDULE.

10 gallons per diem for each adult usually occupying the premises.

5 gallons per diem for each child under 10 years of age usually occupying the premises.

2½ gallons per diem for each employee usually engaged in shops.

2½ gallons per diem for each child usually at school.

10 gallons per diem for each donkey usually kept on the premises.

2½ gallons per diem for each goat or dog usually kept on the premises.

20 gallons per diem for one horse, one mule, or one cow.

15 gallons per diem for each horse, mule, or cow where two animals are kept in one stable.

12 gallons per diem for each horse, mule or cow usually kept where more than two animals are kept and the animals are arranged in rows.

The price of this water whether it is consumed or not is seven cents per hundred gallons. The revenue which the Sanitary Commissioners derived during the year 1918 from the sale of this sanitary water amounted to about $74.000.

As far as this town is concerned there is no likelihood that the supply of water will run short, as the amount of water on hand is sufficient to meet all local requirements until the rainy season commences. To insure this, the supply of rain water to the shipping has been stopped and well water is entirely sold instead and will be the only water issued here during the summer months. Algeciras water, which is of a very good quality, can be obtained at a higher rate, due to extra cost of towage. The price at which drinking water and well water are sold is as follows:

Fresh water to the shipping at 2s. per 100 gallons.

Fresh water to factories, hotels, and private houses at 1s. 3d. per 100 gallons.

Fresh water to cattle sheds, electricity works, and pumping stations at 10d. per 100 gallons.

Fresh water from fountains, delivered in butts (including 1s. 6d. per 100 gallons for cartage), at 2s. 4d. per 100 gallons.

Fresh water from fountains, undelivered, at 10d. per 100 gallons.

Well water to the shipping at 1s. 6d. per 100 gallons.

The usual price at which reservoir water is delivered at dwelling houses by private water sellers is 4 cents per barrel of five gallons, but this varies with the locality and with the demand.

The water to the shipping is supplied by private parties and delivered in water lighters alongside steamers at the following rates: Fresh water and well water, $2.31 per ton plus towage of $14.59 for each trip; Algeciras water, $2.55 per ton plus towage of $19.46 for each trip.

Vessels requiring water have on various occasions met with some delay, and there have also been complaints regarding the quality of water delivered, for which the sanitary commissioners have not been responsible. The sanitary commissioners contemplate purchasing lighters for the delivery of water, and their doing so will no doubt to a great extent improve existing conditions.

JAPANESE ARMY TOYAMA SCHOOL.

Source: Reliable. **14 August 1919.**

(12078.)

In the Ushigome section of Tokyo, about 3 miles from the American Embassy, the Japanese Army Toyama School is located.

The purpose of the school is to train selected officers and noncommissioned officers of all branches of the service to become efficient instructors in physical drill, games, two-handed sword fencing, saber fencing, bayonet fencing, and judo. A small section of the school is devoted to the training of bandsmen and buglers for the various regiments.

The school has large grounds, which are very extensive, covering perhaps 10 acres, and are planted with trees and shrubbery, the whole giving a park-like effect. The buildings of the school are of no regular character, simply small structures scattered about the grounds, several being devoted to each branch of the school. There are in all about 30 buildings, all of which are single story, plain Japanese style, with tile roof, except the headquarters building, which is of two stories. These buildings are all quite old and have no provisions for heating except by "hibachi" (a large earthenware pot containing charcoal), and the sanitary conditions are primitive in the extreme. Those buildings used as dormitories are fitted very simply with plain iron cots, several cots in each small room.

Instructor Personnel.

The training personnel of the athletic school numbers 24, 20 of whom are army officers and 4 civilians. These civilian instructors comprise one judo instructor, one instructor in the two-handed sword fencing (both well-known professionals), one instructor in baseball from the Waseda University of Tokyo, and one instructor in rugby football from the Keio University of Tokyo. The officers instructors

are all captains, and all of them are graduates of the school. In addition to teaching, most of them are taking special studies in one of the branches of the school.

Students.

The students are all army men—noncommissioned officers of the grade of corporal and above, all over ten-years' service captains, first lieutenants, and second lieutenants of all branches of the service, with infantry greatly predominating. Officers and noncommissioned officers alike are chosen for their proficiency in physical drill and games and for their physical fitness. No mental examination is given, either upon entrance or during the term, but a very strict physical examination is given on entrance to the school and another just before graduation. The students are men between 25 and 35 years of age, in the prime of life. None of them are over 40, although there is apparently no general restriction. At the present time there are 90 officers and 110 noncommissioned officers taking the physical course. About 60 noncommissioned officers and officer candidates are taking the course in the band school.

The School Term.

The term of the athletic school is five months, and there are two terms a year, from February 10th to July 10th and from September 15th to January 15th. The interval between the courses is used for special training of the instructors. This interval may be employed hereafter in physical culture and gymnastics of certain selected primary and middle-school teachers, who will be sent to the school by the Governors of prefectures.

THE DAILY AND WEEKLY SCHEDULE IN THE ATHLETIC SCHOOL.

From 8 a. m. to 9.15 a. m. theoretical studies in class room, including anatomy and kindred subjects.

From 9.15 a. m. to 11.45 a. m. setting-up exercises and physical drill with apparatus out of doors.

Following the midday meal, school commences at 1 p. m., and from that time until 3.30 p. m. the students devote their time to fencing exercises with the two-handed sword, saber, and bayonet.

The whole of Saturday is given to judo.

There is no work of any kind on Sunday.

Hours.

Officers taking the course do not sleep in the school, simply coming there at 8 o'clock in the morning and leaving at 3.30. The rest of the time being their own. Noncommissioned officers are required to sleep and mess in the school, but from 3.30 to 5.30 and from 6.30 to 9.30 p. m. they are at liberty to go where they please. This unusual

amount of spare time and recreation given the students is the result of continued experiments. The authorities found that with the extraordinary amount of drill and physical work given a large amount of rest and recreation was necessary. In speaking of this subject one of the instructors told me that as the noncommissioned officers were all carefully selected men of long service they had no trouble with them, resulting from the liberal amount of leave given.

Meals.

Meals served in the school are of the usual army pattern, and no extra allowance of meat or milk is given. However, it is interesting to note that the boarding houses situated near the school and patronized by the officers charge considerably more for meals to officer students of the athletic school than they do to officer students of an engineering school situated nearby, for they say that the athletic students eat much more.

Two-handed Sword Fencing.

An hour a day, five days a week, is devoted to this subject. The chief instructor is a well-known civilian professional, assisted by army instructors. As all students come to the school with some knowledge of two-handed sword fencing, there is practically no elementary course. The exhibitions seen were very fine indeed, and all the students seemed to be proficient. Most of them were on a par with the average professional teacher. Great attention to form is given, and military precision and snap is kept up at all times. Special training had evidently been given in the development of the "kiai" or intimidating shout. This shout, which is a product of the Zen school, is used throughout the Japanese Army in all contests, games, bayonet drills, and giving commands. It has been highly developed and a well-trained officer will emit a series of shrieks, calculated to unnerve his opponent. It is interesting to note, in accordance with the principles developed during the last two years in our own army, that these shrieks are given entirely from the abdomen, without using the throat.

Saber Fencing.

About half an hour a day, five days a week, is given to this subject. A straight wooden sword is used. I thought that this branch had not been so highly developed as fencing with the two-handed sword. The tendency of the Japanese is always to use the edge of the blade instead of the point. With the long two-handed sword this, perhaps, is the best method, but with the straight sword or saber it is inferior to our system, and it is considered that a fairly proficient student of the broadsword, saber, or rapier would have no difficulty in besting a Japanese exponent of the sword.

Bayonet Fencing.

At least an hour a day, five days a week, is devoted to this subject. The usual wooden gun, with attached wooden bayonet is used, the same as issued to all infantry regiments for training purposes. This gun weighs but three pounds and its proportions are not those of the service rifle, as the butt and stock are shorter and smaller than those of the service weapon. The usual defensive armor, made of leather and padded cloth, and a helmet with metal bar vizor toppiece is used. In Japanese bayonet fencing only the thrust is used, and the two points aimed at are the throat and heart. No use whatever is made of the butt, and the weapon is never grasped with both hands near the front sight for fighting body to body. For this reason, I believe the Japanese system to be inferior to those in use in European and American armies. However, a great deal of training is given with the bayonet, and the familiarity thus gained, coupled with the martial spirit fostered by the "kiai," combine to make the Japanese soldier a dangerous man at close quarters. In the Toyama School the bayonet is given with great attention to form and to all details. The proper "guard position" is constantly emphasized and the contestants usually fence in their bare feet. It is in bayonet fencing that the "kiai" is most extensively used. In addition, the contestants assume as fierce an expression as possible, baring the teeth and scowling as they deliver their strokes.

Judo Combined with Bayonet Fencing.

Several different strokes and position of the combination of judo and bayonet fencing were illustrated. These positions were all very simple. However, I believe that the combination of judo and bayonet fencing has been highly developed, but probably the more complicated holds and strokes were considered to be secret. The holds illustrated to me were combinations of the knee-to-crotch strokes, when the men are fighting body to body. A few simple throat strokes were also shown. The combination of judo with bayonet fencing is undoubtedly a good one, and it would not be surprising if more development was made along this line.

Judo.

The whole of Saturday of each week is given over to the study of judo. The principal instructor is a civilian professional from one of the big judo schools in Tokyo. I did not see an exhibition of judo in this school, but presume that it follows the general practice used in the large Japanese schools of Tokyo. If only one day a week for five months is devoted to this science, it is not likely that any great degree of proficiency is attained, as judo is a study which must be followed for years to attain proficiency.

Physical Drill and General Athletic Work.

From two to three hours a day is given to physical drill and general athletic work, in the following proportions: Physical drill, 30 minutes; running broad and high jumps, 30 minutes; bar work, 30 minutes; bayonet runs, 15 minutes; double-time, 15 minutes.

During these exercises both teachers and pupils wear a simple athletic suit of white duck, cut something like a suit of pajamas with long trousers, light shoes of canvas and leather, and a broad web belt about 6 inches in width. A small white cap, similar to a baseball cap, is worn on the head. Officers and noncommissioned officers are grouped separately in sections of 20 men each, each section being under an instructor. All exercises are executed with great snap and precision, and an extraordinary amount of attention is paid to form. The outstanding feature of the course is the very large amount of bar work in proportion to the other studies. The field equipment seemed adequate, trenches and walls being prepared for the bayonet runs and six very horizontal bar sets mounted on stone; also a number of high-broad and high jump pits. During the drills the pupils kept at attention, and when moving from one end of the field to another they marched in formation at attention, usually doing the "goosestep." The head instructor, a captain of infantry, had three years' training at the principal Swedish schools of physical culture. The impression given was that this side of the school's activities was very well handled, indeed. It is interesting to note that the "Kiai" shout is used in all these exercises.

Games.

Both American baseball and English rugby football are played at the Toyama school, the instructors, as mentioned above, coming from the two leading universities of Japan. Games are played several times a week, and teams are organized among the students. In addition, boxing was at one time taught in the school, but was discontinued as being too dangerous. To us this seems strange, because judo is far rougher than boxing, often resulting in broken bones and fractures.

Attached to this report are five post cards showing views of the school. More of these post cards were unattainable.

FRENCH TRADE.

Source: Reliable.

23 August 1919.

(115548.)

Preliminary reports of French trade in the first six months of 1919 have been received. The values of imports reach a stupendous total

of more than 12,000,000,000 francs. Roughly summarized, the imports were as follows:

	Francs.
Foodstuffs	3,500,000,000
Raw materials	5,600,000,000
Manufactured articles	2,600,000,000

The chief sources of imports were as follows:

	Francs.
United States	3,800,000,000
England	3,200,000,000
Argentina	600,000,000

The total exports were valued at less than 2,300,000,000 francs. Of the exports the largest values were in industrial materials and foodstuffs. Manufactured articles, upon the export of which French rehabilitation depends, occupied third place.

French exchange reached a new level of depreciation during the week, with the dollar worth about 8¼ francs.

EXPLOSION ON BOARD ITALIAN CRUISER "BASILICATA."

Source: Reliable.

21 August 1919.

(10707.)

On 13 August 1919, an explosion occurred on board the Italian colonial cruiser *Basilicata* as she was on the point of getting under way in the harbor of Port Said. Fifty men were killed, of whom 20 were negroes—all members of the crew of the *Basilicata.* The vessel sank immediately in 32 feet of water. Even at this date the precise cause and nature of the explosion is not known. It is believed to have been a boiler explosion.

The *Basilicata* had just relieved the cruiser *Calabria* in the Red Sea district, and the *Calabria* had started for Italy, but returned immediately to assist the *Basilicata.*

It was at first reported that the *Basilicata* sank in the canal proper, blocking same. This is not the case. The ship was still at anchor, on the point of getting under way, and was just outside and clear of the entrance to the canal proper.

Arrangements are already being made to raise the *Basilicata.*

FRENCH NAVY'S WAR LOSSES.

Source: Reliable.

(6634D.)

During a recent debate in the French Chamber the war losses of the French Navy in officers and men were given by Mr. Claveille, minister of marine, as follows:

	Killed.	Missing.	Prisoners.	Total.
Officers	282	197	.....	479
Men	5,116	5,005	607	10,728
Military units	123	12	.....	135
Total	5,521	5,214	607	11,342

The war strength of the French Navy was 215,000 officers and men, so that the losses represented nearly 5 per cent of the effective force. The British Navy lost 33,398 in killed and missing, of whom 2,471 were officers. The American Navy's losses were 117 officers and 915 men, a total of 1,032.

INTERNAL COMBUSTION ENGINES.

Source: Reliable.

18 September 1919.

(9802B.)

Investigations have been carried on to determine conditions existing within the cylinder of internal combustion engines. This work has been continued during the past month, and an attempt has been made to detect turbulence within the cylinder and to determine its effect upon the velocity of flame propagation. The results so far obtained indicate that in the vertical plane, including the spark plugs, turbulence is without effect on the motion of the flame and that with advanced spark the velocity of propagation increases.

GERMAN SHIPPING.

Source: Reliable.

23 August 1919.

(11554S.)

With German shipping reduced from 5,500,000 tons in 1914 to 800,000 tons at the present time and with an enormous oversupply of seamen of all classes, the strikes by the seamen of Germany have become particularly bitter. The aim of the sailors seems to be to secure an industrial democracy on shipboard, a motive easily enough understood in view of the brutality of German ship officers in enforcing what they consider "discipline."

The shipment of goods to the United States from Germany has begun. It is stated that the Germans have large cargoes of seeds, cutlery, crockery, toys, and writing paper ready for shipment.

Direct radio communication with the United States has been established.

The Inter-Allied Commission has decided that all duties in the Rhine district are to be paid in depreciated marks, but that the duties on imports from the sea are payable in gold only. Since most of our goods enter Germany at the seaports, while most of the French

and Belgian goods cross the Rhine, the effect of this decision amounts to a discrimination against American interests.

AUSTRIAN FLEET.

Source: Reliable.

(11069.)

(The following article is not confidential, but is published for the information of the service.)

By virtue of Fiume and Trieste becoming Italian ports it is expected here that the greater part of Austria's Adriatic fleet will soon fly the Italian flag. Before the war the Austrian mercantile fleet was about one-third of the Italian tonnage. On the other hand, the Austrian ships were very modern and up to date in every respect. The Austrian tonnage in 1914 amounted to 1,011,000 tons, represented by 430 ships in the Adriatic. The Austrian-Lloyd and the Austro-Americana owned four-tenths of these between them. Austria owned 757,353 tons of shipping, which were registered in the port of Trieste, and Hungary 254,061 tons, registered in Fiume.

These ships are therefore the property of these Adriatic ports, which are now Italian, and the ships are expected to be assigned to Italy with the ports. According to the basis laid down by the Treaty of London and the plebiscite in Fiume—that it, excluding Ragusa—the percentage of Adriatic tonnage which should come to Italy would be 95 per cent.

In addition to the above, there is another strong argument in support of Italy's claim, and that is the wish of the shipowners themselves. The following shipping companies have definitely stated their wish to sail their ships under the Italian flag:

	Number of ships.	Tonnage.
Lloyd-Triestino	67	278,191
Austro-Americana	34	144,700
Tripcovich	16	53,122
Navigaz. Libera Triestina	11	42,015
Navigaz. Gen. Gerotimich	10	40,598
Martinolich	8	31,551
Lussino	5	19,382
Fremuda	5	19,932
Cossovich	4	13,240
Martinolich	7	4,030
Istria-Trieste	11	2,190

The following companies are uncertain:

	Number of ships.	Tonnage.
Ungaro-Croatia (Fiume)	46	17,000
Dalmatia (Trieste)	33	9,500
Ragusea (Trieste)	6	3,500

The following are in favor of the Jugo-Slav flag:

	Number of ships.	Tonnage.
Racich (Trieste)	10	38,800
Lib. Ungaro-Croatia (Fiume)	6	22,000
Napried (Ragusa)	8	22,000
Unione (Ragusa)	6	23,000

The following two companies would fly the flag of the nation owning Fiume:

	Number of ships.	Tonnage.
Adria	33	50,000
Levante	6	2,000

The above figures relate to tonnage existing in 1914. It is estimated that the present number of ex-Austrian ships is 350, of a total of 760,000 tons. Italy's mercantile fleet has been reduced during the war to under 750,000 tons, so that if the Austrian ships were assigned to Italy it would nearly restore her tonnage to the prewar figure. This will probably be used as an argument by the Allies against handing over these ships to Italy. On the other hand, Italy's needs are greater to-day than they were before the war, and the Allies are dividing among themselves the German tonnage.

COMMUNICATIONS.

RADIO COMMUNICATIONS.

Source: Reliable.

Radio Communications of To-day.

(*a*) Commercial communications have been successful at distances which exceed 6,000 kilometers, even in regions possessing difficult climatic conditions, France and the United States for example. Signals have, moreover, been exchanged at much greater distances.

At the Eiffel Tower station signals from Darien are clearly received at a distance of 8,700 kilometers. San Francisco is heard at this station, and even Honolulu at favorable hours (9,300 and 13,200 kilometers, about).

The signals from the Eiffel Tower station are heard in the Sunda Islands and even in the antipodes at a distance of 20,000 kilometers. In New Zealand press telegrams have been recorded.

The Hawaii station states under date of 13 September, 1917: "Signals were almost invariably sufficiently strong to permit copying by machine, despite the most intense atmospherics."

Moreover, the stations just considered are not included amongst the most modern or the most powerful.

The signals from the station at Lyon are regularly received in Indo-China at a distance of 10,000 kilometers. Each day press telegrams are transmitted to Saigon, and yet the Lyon station, although well equipped, is far from possessing all the power that modern apparatus is able to bring into play.

This station only utilizes an energy of 250 kilowatts (100 kilowatts in the antenna). The devices which will probably double this energy are not yet in use.

If we recall that in the case of the most powerful stations actually under construction (Bordeaux-Croix d'Hins and Saigon) the antenna will be higher (eight towers of 250 meters height) and the power much greater (500 kilowatts in the antenna), we may well conclude that commercial traffic may be contemplated throughout distances exceeding 10,000 kilometers and even attaining the antipodes.

(*b*) The fact that it has been possible to hear the human voice across the Atlantic between Arlington and the Eiffel Tower—a distance of 6,100 kilometers (Oct., 1915)—may be considered as a marvelous scientific test. The devices now in use may only be considered as practical at distances not over 1,000 kilometers.

(*c*) The transmitting apparatus has been so perfected that under reduced volume ships may be able to carry wireless outfits capable of a range exceeding 2,000 kilometers.

Dirigibles and even aeroplanes are able to transmit radio telegrams to a distance of several hundred kilometers.

The most difficult desert regions are accessible to mobile stations, transportable on a man's back, by mule or by camel, having a range exceeding 1,000 kilometers.

(*d*) The rapidity of transmission in the case of stations provided with automatic apparatus may attain 150 to 200 words, even more, per minute.

(*e*) The employment of various amplifying devices has made for great efficiency.

The time is already near when, in the immediate neighborhood of a high power transmitting station, the apparatus of reception and transmission will function simultaneously.

(*f*) Outside of bilaterial communications, analagous to telegraphic communications, the hertzian waves are powerful agents for the rapid transmission at the greatest distances of all human thought and of news of all descriptions. They are a means for transmitting propaganda and information.

The Safeguarding of Human Life—Navigation.

(*a*) Apparatus is required on board ships and even certain types of aircraft for sending out calls for help. The wireless station is

also the warning agent which reports dangers, announces storms, warns the navigator of the presence of icebergs, of wrecks, of mines, and gives meteorological information.

(*b*) The radio goniometric devices permit determining the position of a transmitting post with a precision which exceeds 3° when the signals are received with sufficient clearness, and these devices are being more and more extended for maritime navigation.

(*c*) Finally, even in railway service, the utilization of radio telegraphy or telephony is contemplated not only as it concerns the relations between trains under way and their stations and with other trains, but also for communications between the two extremities of a train.

Measurement of Time—Longitudes.

(*a*) The transmission of time by radiotelegraphy which is accurate to within one-third of a second is an established fact.

(*b*) By the transmission of rythmatical beats and the method of coincidences the precision of one-third of a second, necessary for ships and industrial and commercial needs, is greatly exceeded.

Dependent upon the operators and the apparatus at their disposition, a precision varying from one-tenth to one one-hundred-fiftieth of a second may be obtained.

The difference of time between two localities giving the difference of longitude, on the one hand, and the latitude being easily determined, on the other hand, radio telegraphy thus permits the precise measurements necessary for the construction of charts, and this result is extremely important in rather inaccessible regions. In the colonies, where the value of the longitude is particularly difficult to obtain by ordinary methods, the transportation of a radio telegraphic receiver is on the contrary accomplished with the greatest facility.

General Conditions Attending the Employment of Radio Telegraphy and Radiotelephony.

Radio communications are devided into large categories, those relating to mobile stations, in which the station of departure or destination is mobile (ship, aeroplane, railway, etc.), and those of fixed stations.

The advantage of radio telegraphic communication is always very great. The maintenance of cables is extremely costly, and in many cases the submarine conductors occasion in a few days only overhead expenses absorbing a capital sufficient to permit replacing them by hertzian connections—just as regular and protected from accidents and long interruptions.

Telegraphic lines have numerous enemies in the climate—the natives, the fauna, and vegetation.

With the armies in the field, the groups of contiguous stations used to employ wave lengths scarcely differing more than from 3 to 4 per cent.

Under these conditions and if the stations are provided with automatic apparatus, "radiotelegraphic lines" may be organized in large numbers with a view to assisting the telegraphic lines already overloaded or in a bad condition or for entirely replacing them.

Radiotelephony.

Radiotelephony also enters the realm of commercial practice.

One great objection made to its employment was the necessity of utilizing special microphones as soon as the power to be utilized should exceed a certain number of watts. Again, in order to transmit by wireless telephony it was necessary to repair to the station itself—an inconvenience evidently almost prohibitive.

The employment of microphonic amplifiers has facilitated the elimination of this great difficulty.

The subscriber may converse from his own home on a line which connects him to the radiotelephonic station with his ordinary microphone. The microphonic currents amplified at the station will modulate the hertzian waves radiated in space.

Outside of the applications of radiotelephony to navigation, either aerial or sea, its employment may now be anticipated in interior relations, as well as in the communications between States particularly when the voice has to cross considerable over-sea space.

It is still very far from possessing the suppleness and the simplicity of the ordinary telephone.

Its arrangements are more complicated than those of radiotelegraphy. They have a lower output, but they permit two correspondents to enter into direct relation, to exchange their observations themselves, and this advantage will outweigh in many cases the other inconveniences, particularly for certain practical and commercial relations.

Radio Beacon Stations.

Several arrangements have been already stated to enable a station to recognize approximately within a certain zone the direction of a transmitting set. One may realize the service that such stations may render to navigation for determining the position of the vessels in the vicinity of the coasts during thick weather. The idea of installing small coast stations intended specially to emit at regular intervals successions of dashes and dots similar to the luminous signals of lighthouses was realized in France by the lighthouse service.

If the ships were provided with ordinary receivers, the reception of the emissions from the radio beacon would warn them when they

were in a zone where prudence was necessary, the increasing or decreasing intensity of this reception permitting the appreciation of the direction of travel relative to the dangerous point.

The ship organization of radiogoniometric mountings and antennæ giving facility for determining approximately the direction of the transmitting set, might considerably increase the useful effect of the radio beacon. The necessity was also realized of making the radio beacons not only transmitters, but also receivers (radiogoniometric stations), thus learning themselves the position of ships and of indicating the same to the latter.

RADIO FOG SIGNALING.

Source: Bureau of Standards.

18 September 1919.

(9802B.)

In cooperation with the Bureau of Lighthouses experiments are being carried on to establish a radio-fog signaling system. Such a system when perfected will give to the navigator a reliable signal under any conditions of fog and make him independent of the lighthouse. The principal object to be sought is the sending out of a radiosignal automatically from a lighthouse and the reception of this signal upon a ship by a very simple radiodirection finder. If a number of important lighthouses on the Atlantic coast are equipped with this system, the safety of navigation will be greatly advanced. In connection with these experiments, radiotransmitting apparatus is being placed at three lighthouses in Chesapeake Bay and the radioreceiving apparatus and direction finder installed on a lighthouse tender. Three lighthouses are used, so as to give comparative information on different types of modern transmitting equipment, and to determine which is the best suited for this work. The apparatus is of special types developed by the bureau as a result of some of its researches on radio problems during the war.

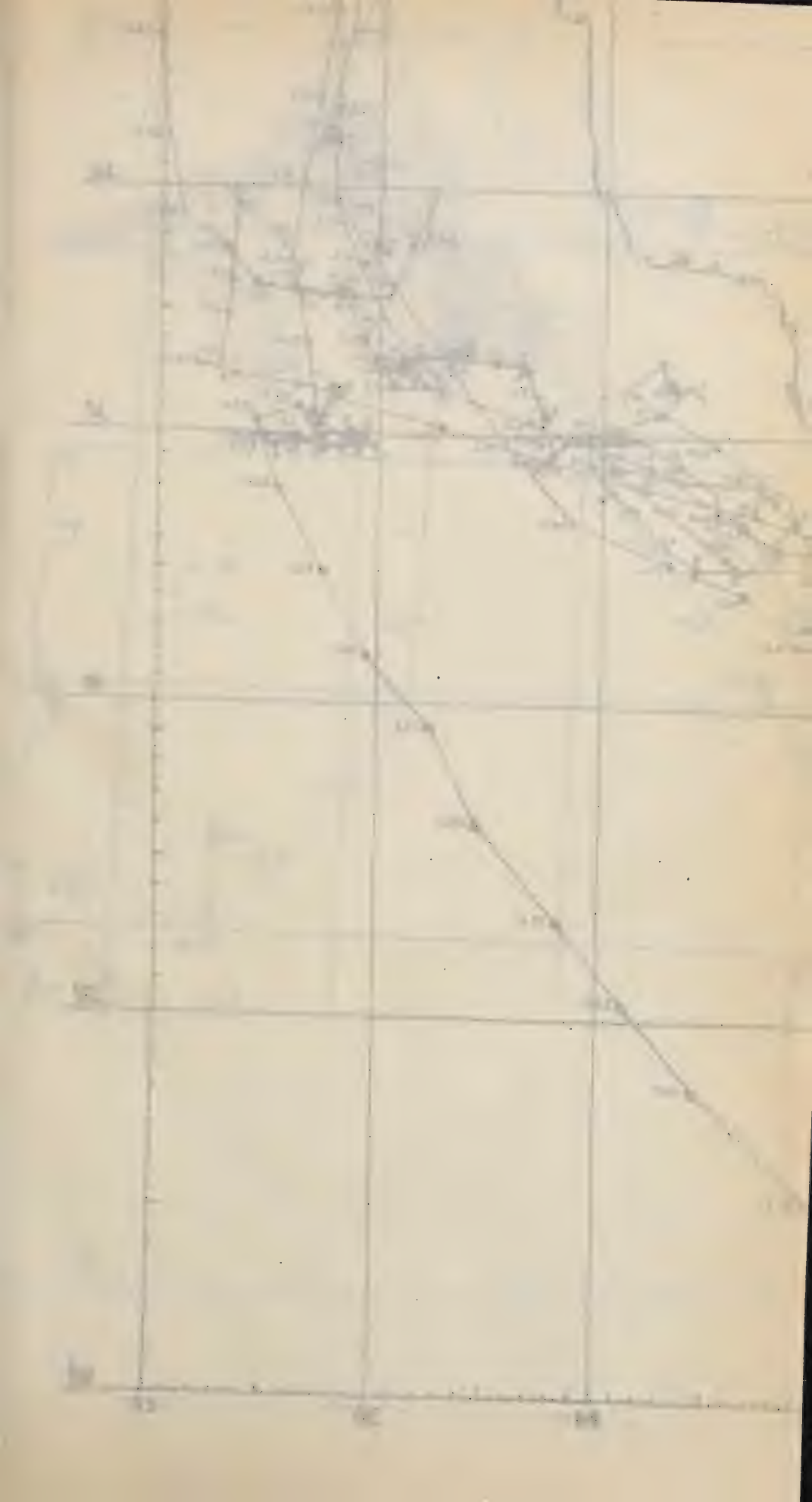
WIRELESS TELEGRAPHY.

Source: Reliable.

23 August 1919.

(11554S.)

It is reported that a new wireless station which will have a sending radius of 12,500 miles is to be erected near Bordeaux. It will have five times the strength of the Eiffel Tower, three times that of Lyon, twice that of Nauen, and will be able to reach all French colonies throughout the world. It will have a capacity of 72,000 words a day.



Kreuzfahrt S. M. Hilfskreuzer „Prinz Eitel Friedrich" und „Kronprinz Wilhelm" 1914 1915.



GERMAN COMMERCE RAIDERS.

Source: Reliable.

12 September 1919.

Cruise of the German Raider "Kronprinz Wilhelm."

The *Kronprinz Wilhelm* left New York Harbor 3 August 1914. Off the Bermudas she was met by the German cruiser *Karlsruhe*. She took from her two 3-inch guns, which were mounted on the bow of the ship, and Lieut. Capt. Thierfielder, her navigating officer, to command the *Kronprinz Wilhelm*.

During her cruise, which lasted about eight months, she captured and sunk the following vessels:

Date.	Type.	Name.	Tonnage.	Register.
1914.				
Aug. 6	Steamship	Indian Prince	2,846	British.
Sept. 17	Steamship	La Correntina	8,529	British.
Oct. 7	Bark	Union	2,183	French.
Dec. 4	Steamship	Mont Agel	4,803	French.
Dec. 4	Steamship	Bellevue	3,814	British.
Dec. 10	Steamship	Hemisphere	3,486	British.
1915.				
Jan. 10	Steamship	Potaro	4,419	British.
Jan. 14	Steamship	Highland Brae	7,634	British.
Jan. 14	Schooner	Wilfrid M	2,513	British.
Feb. 3	Bark	Semantha	2,280	Norwegian.
Feb. 21	Steamship	Anne De Bretagne	2,063	French.
Feb. 23	Steamship	Guadeloupe	6,600	French.
Mar. 24	Steamship	Tamar	3,207	British.
Mar. 27	Steamship	Coleby	3,824	British.
	Total		58,201	
Feb. 20	Steamship	Chasehill [1]	4,583	British.

[1] Captured and released.

The *Kronprinz Wilhelm* came into Newport News, Va., April 11, 1915, where she was interned.

Cruise of the German Raider "Prinz Eitel Friedrich."

The German cruiser *Prinz Eitel Friedrich* left Tsingtao, China, August 4, 1914, in command of Capt. Thierichens.

During her cruise, which lasted about seven months, the following ships were sunk by her:

Date.	Type.	Name.	Tonnage.	Register.
1915.				
Jan. 27	Bark	Isabel Browne		Russian.
Jan. 27	Bark	Pierre Loti		French.
Jan. 28	Steamship	William P. Frye	[1] 3,374	American.
Jan. 28	Bark	Jacobsen		French.
Feb. 12	Bark	Invercoe		British.
Feb. 18	Steamer	Mary Ada Short		British.
Feb. 19	Steamer	Florida		French.
Feb. 20	Steamer	Willerby		British.

[1] Gross tonnage.

The Prinz Eitel Friedrich came into Newport News, Va., March 10, 1915, where she was interned.

See chart showing tracks of these two vessels.

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OFFICE OF NAVAL INTELLIGENCE

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MONTHLY INFORMATION BULLETIN

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15 NOVEMBER 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 November, 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE
NAVY DEPARTMENT
Washington, D. C.

MONTHLY INFORMATION BULLETIN

NUMBER 11

15 NOVEMBER 1919

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

CONFIDENTIAL.

OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 11—1919—15 November 1919.

FOR CONVENIENCE IN ROUTING.

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Executive Officer			
First Lieutenant			
Navigating Officer			
Gunnery Officer			
Communication Officer			
Engineer Officer			
Medical Officer			
Supply Officer			
First Division Officer			
Second Division Officer			
Third Division Officer			
Fourth Division Officer			
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OPERATIONS.

THE SINKING OF THE GERMAN SHIPS AT SCAPA FLOW.

Source: Reliable.

9 October 1919.

(10957B.)

It is probable that the plans for the sinking of the interned ships were elaborated in Germany, and that Rear Admiral von Reuter, in acting as he did, was but following the orders of his Government, or, probably, of the German military party. There follows the order signed by Admiral von Reuter, dated 17 June 1919:

Translation.

To the Commanding Officer:

1. Each commanding officer will make the necessary preparations for sinking his ship so that, after receipt of orders, it may be sunk as rapidly as possible.

2. Preparations will be completed after the crews have been removed. The commanding officers will decide for themselves what men selected from the crews may be trusted, without betraying our intentions in any way to the English.

3. The following preparatory measures will be taken:

Leave open, in such a way that they can not be closed again, all doors and interior hatches, such as communication doors, storeroom doors, and bulkhead doors, hatchways, ports, ventilators, and scuppers.

At the discretion of the commanding officer the following measures may be added: Devices making possible the quick opening of torpedo tubes, condensers, sluices, communicating valves, and the flooding of the main drainpipes.

4. *Lifeboats.*—If possible, only one boat for carrying the crew will be kept in readiness for lowering. A white flag will be put into the boat. On leaving the ship the boats containing the men will head towards land, taking the shortest route; they will be under the orders of their officers.

5. The sinking of the ships will not take place except—

(*a*) In the event of armed intervention on the part of the English.

(*b*) On receipt of special orders given by me.

6. Referring to paragraph 5 (*a*):

Officers must make a careful study of the measures to be taken to insure the sinking of their ships in case the English should attempt to take these ships by surprise.

A request to surrender should be considered as capture by force, and should be answered by sinking the ships.

7. In reference to paragraph 5 (*b*):

Orders may be given—

(*a*) to sink the ship immediately;

(*b*) or to sink the ship at a given hour.

8. *Signals.*—For immediate sinking, the following signals will be given:

To all commanding officers and to the file leader of the torpedo boats.

Paragraph II, dated to-day.

Chief of the interned squadron.

The signal will be transmitted by every method available. The sinking of the ships will commence immediately.

The following signal will be given for sinking the ships at a given hour 7 (b):

To all commanding officers and to the chief of file of the torpedo boats:

Paragraph 0913 "acknowledge receipt."

Chief of the interned squadron.

In this visual signal, the two first numbers indicate the date (that is to say the 9) and the two last, the hour at which the sinking of the ships is to commence.

The time will be rated from noon to noon (astronomically).

9. *Acknowledgement of receipt.*—The acknowledgement of receipt of the visual signal will be as follows:

To the chief of the interned squadron:

Paragraph of the visual signal received,

The commanding officer.

10. As the acceptance, or the nonacceptance, of the peace terms and the reopening of hostilities, may be decided at any moment, we are approaching an especially critical time.

From 18 June, a constant vigilance, by day and night, will be necessary in order to watch not only for anything unusual in the attitude of the English, but also for signals from the *Emden.* As it is not possible to place absolute confidence in the men, the officers themselves must take the necessary watches.

11. It is my intention to sink the ships only in the event of the enemy attempting to take possession of them without the consent of our Government. If our Government agrees to surrender the ships, in accordance with the peace terms, the ships will be delivered, to

the everlasting shame of those who have placed us in this position.

12. The commanding officers will keep this document under lock and key; it must not fall into the hands of the enemy.

(Signed) VON REUTER.

Another confirmation of the opinion that instructions for the sinking of the ships emanated from Germany, is furnished us by the fact that Lieut. Steiner, in command of the division of German destroyers, stated "that they had held themselves in readiness throughout the past month to sink their ships, and that only five minutes elapsed" between the receipt of the order to scuttle the ships and its execution. (A fact which denotes careful preparation.)

In paragraph 6 of the orders given by Rear Admiral Von Reuter, commanding officers of German vessels received orders to sink their ships if the English should attempt to seize them. In his instructions, Rear Admiral Von Reuter makes the statement that he intended to sink the ships only "if the enemy wished to seize them against wishes of the Government." This statement, however, does not agree with that made by him on board the *Revenge*, i. e., that he would have sunk the ships whether the British Admiral had been in port or not.

The conclusion reached is that orders were sent from Germany to the effect that the interned ships must be sunk, and under no circumstances surrendered, and that the necessary arrangements were completed Wednesday, 18 June, or later, when the men who had embarked at Scapa the day before were safely in Germany. Apparently the plans for sinking and damaging the ships were known only to the officers, but even had they been more widely spread there would have been very little chance of their becoming known to the officers and men of the British Fleet, by reason of the little communication allowed between the two fleets. Evidence of the ease with which the preparations for sinking the ships were accomplished is to be found in the report of the commanding officer of the trawler *C. D. No. 2*, which was alongside the *Emden* at noon on the 21st; in his report he states that the officers were eating breakfast while the ship was sinking and that, up to the moment when the crew of the *Emden* left the ship over the stern, the sailors on the drifter had noticed nothing unusual.

The small steamer *Nellie Land* was alongside the *Bayern*, shipping supplies, when the *Bayern* began to sink.

On Saturday, 21 June, 1919, the first battle squadron was at sea finishing a target and torpedo-launching practice which had been delayed by bad weather.

It was doubtless the absence of the cruisers which determined Admiral von Reuter in his choice of the moment for sinking the interned ships.

¶If the cruisers had been at anchor, it is probable that Rear Admiral von Reuter would have ordered that the ships be sunk during the night. It is evident, moreover, that the sinking of the ships under these circumstances would have been less quickly discovered, and that the arrival of the armed detachments would have been delayed longer.

The presence of the cruisers at anchor would in no way have disturbed the German officers if they had decided to open the sea valves. It is certain that this work was performed by the officers and not by the men.

It is equally doubtful whether the presence of our ships would have had any effect on the number of losses.

In fact, the guard destroyer *Wescott* was powerless to save the *Hindenburg*, owing to the short time that is required to sink a ship. The detachments of our cruisers sent to seize the German ships doubtless would have arrived too late to keep them afloat; it is calculated that a ship of the *Queen Elizabeth* type, for example, may be sunk in between 25 minutes and 1 hour from the time that the order is received; the *Kaiser Friedrich der Grosse* sank 50 minutes after the command was given by Rear Admiral von Reuter (11.20 a. m. to 12.10 p. m.) Even if a ship were emptied of water in half the time mentioned above, it would be too late to save it.

Nothing unusual was observed by the *Victorious*, which was at anchor at the middle of the anchoring ground of the German destroyers in Gutter Sound until after 12 o'clock noon; that is to say, three-quarters of an hour after the signal ordering the sinking of the ships had been given by the *Emden*.

The usual guard was at anchor; it was composed of seven trawlers and drifters, commanded by officers and manned by sailors of the regular service, and was under steam; and two destroyers which, either under steam, or at anchor, required only five minutes to be got under way.

It is not thought that von Reuter's signal to the commander of the *Nation Baltique* should have aroused any suspicions.

There seemed to be no reason to fear that Admiral von Reuter would authorize any violation of the terms of the armistice. All the officers in command of the guard of the ships interned at Scapa have reported that they did their best—successfully as a rule—to carry out the instructions given them.

Orders were issued concerning the taking possession of the German ships, if any violation of the terms of the armistice should occur, or

if such a thing were suspected. Precautionary measures concerning any political circumstance which might possibly lead to a violation of the armistice on the part of Rear Admiral von Reuter were also taken.

On the evening of 21 June information was received stating that the naval measure already approved (the taking over of the German ships) would be put into effect as soon as the armistice expired, if, before this time, the Germans had not decided to sign the peace treaty.

On receiving this information it was the intention to order the commanding officer at Scapa to summon Rear Admiral von Reuter in order to communicate to him this decision and to inform him that he (von Reuter) would be held responsible for the interned ships until they had been turned over to the English.

It is evident, from the orders given by Rear Admiral von Reuter, that the ships would have been sunk at the first attempt to take possession of them.

It was considered that there was no legal right to place armed guards on board the interned ships or to take possession of them, as long as there was no reason to doubt the honor of Rear Admiral von Reuter or to believe that he had lost his authority over the crews on the ships.

Thanks to the zeal and to the resource shown it was possible to run aground the destroyers and light cruisers, and to save the *Baden*.

At the time of the sinking of the interned fleet the First Division of the First Battle Squadron (*Revenge*, *Ramillies*, and *Royal Sovereign*) was 58° 33′ N., 2° 29′ W., 25 miles from the entrance of Scapa Flow, and the Second Division (*Resolution*, *Royal Oak*), 10 miles to the south, both about to take their positions for the next bout.

In the roadstead were three Coast Guard destroyers, two of which, the guard ships *Walpole*, and *Westcott*, were under steam and were at their customary anchorage; that is to say, at the buoys *D7* and *J4* in the neighborhood of the German destroyers at the end of one of the lines of large ships.

Four guard trawlers were patrolling the German ships in accordance with orders. They were the *Cabalsin*, *Cuswosin*, *Ramna* and *Caersin*. The drifter messengers *C. D. 1* and *Truston*, and the commanding trawler *Recluse*, were likewise near the German ships.

At 12.30 o'clock a wireless message from the *Westcott* stated: "German cruiser gone to the bottom"; followed shortly by a message stating "German cruisers *Kaiser Friedrich* class, sunk. All the cruisers and destroyers are flying the German flag. Crews of the destroyers preparing to leave."

The practice was stopped immediately and all ships headed under full steam for Scapa Flow. The *Spencer* was ordered to return as quickly as possible with six destroyers to Gutter Sound, and to do all that was necessary. Instructions were given to demand the surrender of the German ships, to board them, and, if necessary, to fire upon them.

The Second Division of cruisers was ordered to return to the anchoring ground at full speed.

The First Division dropped anchor at Scapa Flow at 2.30 p. m., the Second Division at 4 p. m.; the two divisions anchored near the German Fleet.

While returning to the anchoring ground orders were given to send all available trawlers and drifters to the cruisers on their arrival; the marines were ready to land; three squads of armed guards on board each ship were likewise in readiness, and the steam launches and launches were armed; orders were given as to the measures to be taken on arrival.

The only seagoing ships remaining in port after the departure of the first battle squadron and the destroyers were:

Sandhurst	Supply ship for destroyers.
Vega	In poor condition—alongside the *Sandhurst*.
Walpole	Guard ship for the German destroyers—under steam.
Westcott	Guard ship detailed to guard the German ships—under steam.

A certain number of trawlers and drifters armed by the First Battle Squadron.

The destroyer *Westcott* reported at noon that a German cruiser was sinking; at the same moment it was remarked by the *Victorious* that the interned vessels and destroyers were flying the German flag and a red guidon, the meaning given to this latter by German officers being "engage in battle."

All small craft were immediately summoned in the vicinity of the *Victorious*. On their arrival some were sent to the Flow to await the arrival of the First Battle Squadron; others were sent to assist in saving the German ships; still others were sent to pick up the Germans who were leaving their ships.

It was decided that it was useless to lose time in trying to save the large German ships; but to concentrate all efforts on saving the destroyers.

The Admiralty officer of the port received an order to slip the chains of the destroyers and to run them aground. Considerable trouble was experienced in slipping the chains, which were turned several times about the bitts and lashed above, while the coupling

pins had been hammered in such a way that it was impossible to remove them.

In spite of all, the efforts of the flotilla were crowned with the greatest success; they ran aground not less than 13 German destroyers. The rear admiral's tugboats also slipped the chain of the *Bremse* and assisted in towing her; the same was done with the *Emden*, and an unsuccessful attempt was made to tow the *Dresden*.

The commanding officer of the *Sandhurst* who, after the departure of the First Battle Squadron and of the destroyers, became the commanding officer at Scapa, decided to make use of the troops, and gave them the following emergency orders:

(*a*) To carry the Germans back to their ships.

(*b*) Prevent them from disembarking in large numbers.

(*c*) If possible, to prevent the ships from sinking.

(*d*) To run aground such ships as could not be kept afloat.

As it seemed that nothing much could be done with the large ships, attention was concentrated on the destroyers.

A squad was sent from the *Sandhurst* to try to save the destroyers (12); the result was 4 sunk, 7 run ashore and 1 kept afloat.

The *Sandhurst* took on board the German prisoners from the destroyers while waiting to transfer them to cruisers.

All available officers on the *Sanhurst* were sent in a small boat to force the Germans in the lifeboats to return to their ships. This measure, which in certain cases was enforced by fire being directed on the boats which would not obey orders, was extremely efficacious and without doubt delayed the sinking of several destroyers, thus making it possible to cut their cables and run them aground.

On seeing what was happening, the *Walpole* left its mooring buoy. After forcing the crews of the German destroyers, by rifle fire, to return to their ships, and sending squads on board the six German destroyers to compel the crews to close the hatches, etc., it approached the *Nurnberg*, slipped her cable and towed her ashore.

At 12.05 the *Westcott* observed that the *Kaiser Friedrich der Grosse* was beginning to list, weighed anchor, and went off toward Gutter Sound to report to the *Victorious*.

When she returned to the anchoring ground of the large ships squads were sent on board two German destroyers and succeeded in running them ashore before they sank.

Seeing that of all the battle cruisers the *Hindenburg* probably would remain afloat the longest, the commanding officer boarded her with a squad, which was ordered to do everything possible to prevent her from sinking.

The squad in question was able to close several water-tight doors. As it was impossible to slip the chains (the two anchors being

moored), they were cut by means of charges of $2\frac{1}{4}$ liters of powder placed on each chain just above the water line.

The ship was taken in tow, but there was not time to run her ashore before she sank and settled in 11 fathoms of water.

Although the *Westcott* was quick in reporting conditions, and her crew did good work on board the *Hindenburg*, it is to be regretted, since it was upon this vessel that the immediate responsibility of guarding the German ships rested, that her commanding officer did not force the Germans, by means of rifle fire, to return to their ships, and that he did not pick up or sink the boats. There was a very strict order that under no circumstances could the Germans launch a boat without permission; this order was well known and was enforced.

The two drifters *Ramna* and *Truston*, with a crew taken from the flotilla of destroyers and commanded, respectively, by a sublieutenant and a midshipman, rendered excellent service in driving back the crews of the German destroyers to their ships, by means of rifle fire, and, later, in helping to cut the cables of the German destroyers.

The *Vega* weighed anchor at 12.45 p. m., came alongside two German destroyers, placed squads on board them, and succeeded in running another ashore before it sank. In consequence of a wrong movement of her engines, she collided with a destroyer and her bow was seriously damaged.

The guard trawler *Cudwosin* (with a crew taken from the *Ramillies*), hailed the captain of the *Konig Albert* as his men were leaving the ship in boats and ordered him to make them return, threatening to fire if this command was not obeyed. Unfortunately, the officer in command on the *Cudwosin* did not carry out his threat when the boats, drawing away, raised the white flag.

The guard trawler *Cabalsin* (with a crew taken from the *Royal Oak*), observed, at 11.30 a. m., a boat being launched from the *Friedrich der Grosse*." She sent a vedette to inform the guard destroyer. She then opened fire on the boats from the *Bayern* and ordered them to return to their ship. The commanding officer on the *Cabalsin* also opened fire on the *Markgraf*, which was attempting to lower a steam launch, and on the boats belonging to several other vessels, but as the ships were about to sink this fire had no effect.

The trawler *Clonsin* (with a crew from the *Resolution*) was on guard offshore, but gave able assistance to the *Walpole* by delaying the sinking of the *Nurnberg* and slipping her cable.

The trawler *Caserin* (manned by the crew of the *Revenge*) had on board Mr. Bernard Gribble, R. A., who had been given every facility for drawing. At noon, this trawler was abreast of the *Baden*, and while awaiting the arrival of the guard trawler prevented the lower-

ing of the *Baden's* boats. She then took in tow four boats belonging to the *Frankfurt*, forced the men in them to return to their ship, and cutting the moorings, set the boats adrift. To this remarkable achievement is due the delay in the sinking of the *Frankfurt*, in consequence of which it was possible to run her ashore.

At noon the trawler *C. D. 2* (with a crew from the *Ramillies*) was alongside the *Emden* superintending the taking off of provisions meant for the officers who were going on board the *Dollart*. It is stated by the commanding officer that the majority of the officers were at table, when the men ran forward crying that the ship was sinking. The German rear admiral and his flag captain attempted to board the trawler, but they were ordered to return to their own ship. The commanding officer of the *C. D. 2* stayed by the *Emden* until the arrival of the *Shakespeare*. Evidently, there was a panic on the *Emden;* she was abandoned in great haste and her sinking was much less efficiently accomplished than was the case with the majority of the other ships. It is possible that this was due to the presence of three British trawlers alongside.

The drifter *Recluse* (with a crew from the *Ramillies*) was also alongside the *Emden* (carrying orders) and took her crew on board.

The drifter *C. D. 1* (with a crew from the *Royal Oak*) was alongside in the capacity of a fleet messenger. The German rear admiral and his staff boarded her and were taken to Houten Bay and later put on board the *Revenge*.

The trawler *Caserin* (with a crew from the *Royal Oak*) was some distance away; she picked up the Germans in the boats.

The trawler *Nellie Land*, with a fatigue party of three men from the *Royal Oak*, commanded by a master gunner, was employed in taking off supplies from the *Bayern* to be transferred to the German transport. The gunner proved to possess intelligence and initiative, and took command of the trawler, boarded the *Kronprinz Wilhelm* and notified her commander that he would open fire if any attempt was made to leave the ship; he then took up a position between the *Kronprinz Wilhelm* and the *Markgraf* and opened fire on all Germans who attempted to escape in boats. He took more than 100 German prisoners and put them in the hold of the trawler until such time as he could transfer them to a cruiser.

The trawler *Classin* (with a crew from the *Revenge*), which was some distance away, after having slipped the cable of the *Dresden*, preparatory to taking her in tow (the *Dresden* sank before this could be done), gave able assistance in running aground the *Bremse* and the *Frankfurt*.

The trawler *Coalsin* (with a crew from the *Royal Sovereign*) was coaling in Gutter Sound and assisted in slipping the cables of the destroyers and towing them ashore.

The measures taken by the three destroyers and the trawlers with their crews were of the greatest help; it is owing to the initiative and decision of their officers, who so quickly grasped the situation and fired on the German boats, that it was possible to save the *Baden*, the *Frankfurt*, and the *Nurnberg*. The majority of the ships being in the responsible position of guard ships, acted along the same lines; among these, there were some which were a considerable distance from the German ships when the trouble began, and the boats (all of which were flying white flags) were so far away as to make it impossible to take back each one to the ship to which it belonged. All the ships, however, gave effective assistance in surrounding the German boats, some of which headed toward Kirkwall, and in preventing disembarkment.

1. The measures taken by the battle squadron on arrival were as follows:

(1) Three armed detachments were sent by each ship of the First Division on different trawlers. The detachments from the *Revenge* were ordered to give their attention to the German ships to the southwest; those from the *Ramillies* to the center; those from the *Royal Sovereign* to the extreme northeast. The order given to the armed detachments was to board every ship which it might be possible to save, and to take every measure to prevent its sinking.

On their arrival the *Resolution* and the *Royal Oak* were ordered to send salvage squads to the *Baden* and the *Emden*, as there seemed to be a possibility of saving these two ships.

(2) All detachment of marines were sent ashore and were stationed at different points along the coast in the vicinity of the German ships and destroyers. They were ordered to patrol the coast, to seize all Germans who were able to land, and to reassure the local population.

(3) All steamships and launches which were not employed in landing the marines were sent to seize the German boats and to make prisoners of the occupants.

(4) A destroyer was sent to the entrance of Hoxa, so that no German craft could leave the port.

(5) Aeroplanes were sent to patrol the coast, and to report any German boat which might approach unobserved by the small British craft.

At the time of arrival of the battle squadron (at 2.30 p. m.), the *Baden*, the *Markgraf*, the *Brummer* and the *Frankfurt* were still afloat, though sinking perceptibly. Not a German flag was flying. A large number of German boats, filled with officers and men, and flying the white flag, apparently were awaiting our arrival. Destroyers, tugboats, and trawlers were making every effort to slip the cables of the light cruisers and run them ashore. Drifters and other

small steamships were taking on board officers and men from the boats.

The *Derfflinger* sank at 2.45 p. m.

The detachments ordered to make preparations on board for towing left the ships rapidly.

The detachments of marines found no Germans on shore and, after patrolling the coast, returned to their ships at between 8 p. m. and midnight.

The prisoners already in the small craft, and those who had been picked up by the small boats belonging to the squadron, were assembled on board the cruisers to the number of about 1,820, and the following commands were issued in regard to them:

I consider that by their act of treachery the German prisoners of war have renounced all right to treatment other than that dictated by common humanity. They should be treated with the greatest severity. The officers will receive the same treatment as the men, except that they will be kept separate from the latter. Every officer or man who speaks to a British officer must salute him.

The men will stand at attention when passed in review by a British officer, or when an officer inspects their quarters. British inspection officers will be accompanied by a sufficiently strong guard to insure the carrying out of these orders. Prisoners and their belongings will be carefully searched, and they will be allowed to keep only strictly personal effects.

The prisoners will remain on board the boats for the night.

The following order was issued:

"The commanders, all engineer officers and men of the *Baden*, the *Emden*, the *Frankfurt*, and the *Nurnberg* will be placed on board the *Resolution* before departure."

It was the intention to leave the *Resolution* at Scapa in charge of the *Baden* and the light cruisers which had been run ashore, while the rest of the squadron headed for Cromarty, there to land the prisoners.

"Revenge."

A squad from the *Westcott* on board the *Hindenburg* tried to close the doors and scuppers, but with little success; the chains were cut by using 2¼-pound charges, and the *Westcott* started to tow the ship, but the water came in through the scuppers of the main deck and the vessel sank at 4.15 p. m., shortly after the arrival of the detachment from the *Revenge*.

On the *Markgraf:* A squad from the *Vectis*, on board this vessel, did not succeed in slipping or in cutting her chains, although she had been taken in tow. A squad from the *Revenge* was unable to do much, but remained on board until the upper deck was under water and the ship began to sink.

She sank at 4.30 p. m.

Reinforcement squads from other ships were sent to the *Baden* and to the *Emden*.

"Royal Sovereign."

On the *Frankfurt:* This ship was towed by the *Wessex*, a tugboat, and a trawler, her chains having been slipped, and some officers and men from the *Wessex* were on board, as well as some German officers and men; the valves were found to be fixed so that they could not be closed; the rods of these valves had been cut, the rubber removed from the hatches and scuppers, the bolts on the water-tight doors damaged, and the ladders had been removed, and a great deal of water was coming aboard. The ship was towed to shore and run aground in 3½ fathoms of water before it sank.

Reinforcement squads were sent from other ships to the *Markgraf* and to the *Baden.*

"Royal Oak."

The *Nurnberg* was run aground, and all her engine rooms and three out of four of her firerooms were found to be full of water. Everything possible was closed, such as doors, hatches, and scuppers, a number of leaks were stopped, and the anchor was lowered to insure the safety of the ship.

"Ramillies."

The *Baden:* This ship was found to be filling rapidly; all water-tight doors and scuppers were open, but the lighting system was still working. She was searched from top to bottom. A certain number of openings and valves leading to the engine and the boilers were closed, as well as all water-tight doors, hatches, and scuppers. The Diesel dynamos were kept running. Great dexterity and quickness was shown in accomplishing this task, the result being that the ship was saved.

Reinforcement squads from other ships were sent to the *Markgraf.*

Evolutions of the Destroyers after Their Arrival.

As has already been said, the *Spencer* and the *Shakespeare*, accompanied by the seven destroyers *Vedette*, *Westminster*, *Winchelsea*, *Vectis*, *Vesper*, *Venetia*, and *Wessex* were at sea with the First Battle Squadron.

This force arrived from Gutter Sound toward 2 p. m.; of the 50 enemy destroyers, a certain number had sunk, some were still afloat, others had been taken in tow by trawlers or steam launches, and still others had already run aground.

The *Spencer*, coming alongside the *S. 132* and *V. 43*, found them about to sink; the commander of the group was summoned, and was informed categorically that he and his officers would be held responsible if any one of the ships should sink. In consequence, the commander gave orders to stop the leaks and to put the *S. 132* under steam. The *S. 132* was saved, but eventually the *V. 43* had to be run aground.

The *Shakespeare*, observing that the *Emden* was less low in the water than the other ships, went alongside her. The water reached the level of the floor plates of the engine room and stokeholes. She closed two openings in the engine room, as well as all the water-tight doors, cut the chain and, with the assistance of a tugboat and a trawler, towed the vessel to shore.

The *Vectis* took the *Markgraf* in tow. Though the cable reliever had been removed and the choking frame opened, the chain would not run out. The ship was kept in tow for half an hour, but the chain was not cut in time, and the attempt to run the ship aground before it could sink was unsuccessful.

The *Winchelsea* came alongside the *G. 92* and towed it ashore.

The *Venetia* came alongside the *Bremen*, slipped her cable, took her in tow and, with the help of two tugboats, ran her aground. The *Bremen* capsized almost immediately and remained almost bottom up.

The *Wessex* went alongside the *Frankfurt;* 14 German officers and sailors were found on board. They were flying a white flag. The *Wessex* immediately took the *Frankfurt* in tow and, with the help of a detachment from the *Royal Sovereign* for maneuvering, and of the trawler *Classin*, for towing, succeeded in running the *Frankfurt* aground in 4 fathoms of water in the Bay of Smoogroo.

General Observations.

There was no reason to criticize the conduct of the officers and men on board the interned ships with the exceptions mentioned below.

All orders were transmitted to Rear Admiral von Reuter, who obeyed them promptly.

The departure and arrival of the messenger, the transfer of chaplains, doctors, and invalids, the unloading of the German supply ship, the sending home of about 2,200 men of all ranks, the replenishing of coal ships, water ships, etc., all this was accomplished without friction, and orders concerning were followed strictly.

Although, as a rule, no communication was allowed between the German ships, it is evident that the indispensable operations enumerated in the preceding paragraph necessitated a certain amount of direct or indirect communication between Admiral von Reuter and the interned ships. It was necessary, from time to time, that his staff officers should visit the other ships in order to make arrangement for sending home the 2,200 officers and men.

The only exception to the general good behavior of the German officers and men happened on 31 May, the anniversary of the Jutland battle. On this occasion the *Seydlitz*, the *Moltke*, and the greater number of destroyers hoisted the German colors and the red flag. Orders were given that no German flag, or red flag, visible outside

the ship, should be raised, and that no dressing of the ships would be allowed. These orders were carried out after a great display had been made, but certain destroyers set off some Very rockets at midnight.

There was no fear that any serious violation of the armistice would occur before the last moments preceding the signing of the treaty by the German representatives.

It was greatly feared, however, that damage would be done to the German ships in the following contingencies:

(1) If the treaty were signed during the interval of time elapsing between the signing of the treaty and the sending home of the German officers and men; or

(2) If the treaty were not signed before making sure of the delivery of the ships.

Rear Admiral von Reuter's Motives.

On his arrival on board ship, to give himself up as prisoner, von Reuter took the responsibility for the occurrences which had just taken place. The officers and men had no part in it.

13 June Rear Admiral von Reuter had asked to be relieved of his office, on account of ill health. A medical certificate was attached, stating that the rear admiral was suffering from "very serious digestive trouble," presupposing the existence of an internal malady; from pains in the intestines, almost constant insomnia, very severe headaches and daily vertigo—in fact, that his nervous system was severely shattered.

It is believed that his request to be relieved was both just and desirable. The commander in chief gave his consent on 15 June.

The appearance of ill health shown by Rear Admiral von Reuter, the extreme nervousness of his manner while he was a prisoner on board the *Revenge*, confirmed the report of the doctor.

After the departure of the First Battle Squadron on the morning of 21 June, the following translation of a message from von Reuter was received.

He requested the immediate sending of a message of the greatest importance, a message which purported to be as follows:

To the Minister of Imperial Defense, Chief of the Admiralty, Chief of the Baltic Station, Chief of the North Sea Station.

JUNE 21.

I noticed today in the English papers that in the German counter propositions the Government suggests employing the interned ships for commercial purposes. While admitting the acuteness of economical distress, my sentiments of patriotism make it impossible for me to agree to such treatment being inflicted upon the interned German fleet. I am certain that this feeling is shared by all the officers of the squadron. Therefore, I ask a revision of the peace terms, or, if this can not be done, that we, officers and functionaries, may be relieved before the ships are delivered.

(Signed) Rear Admiral VON REUTER.

It seems reasonable to suppose that the above message was dated June 21, and that it must have been written only a few hours before the decision was made, and the order given to sink the ships.

By examining the copy of the orders issued by the rear admiral, dated 17 June, it will be seen that his first intention was to sink the ships only "If the enemy wished to take possession of them without the consent of our Government. If, in the treaty, our Government agrees to surrender the ships, we will do so, to the eternal shame of those who have placed us in such a position."

According to the log of the *Baden*, it is evident that no warning signal was given, and that the exact order for the sinking of the ships (an order which, because of the wide area over which the ships were spread, and the many islands interposed, must have taken considerable time to reach all of them) was given at 11.20 a. m.

The opinion that the order was entirely unexpected is supported by the fact that no acts of sabotage were committed other than those necessary to assure the rapid sinking of the ships; also by the state of the officers' cabins and the men's quarters, where the trunks and valises had been packed with great haste, and by the fact that on some of the ships the noonday meal remained intact on the tables.

When he was prisoner on board the *Revenge*, the rear admiral asked to see the interpreter, to whom he made the following statement:

He said that he failed to understand why the sinking of the ships should be considered an act of perfidy, as he was under the impression that the armistice had expired.

He had written the letter the day before, which was received Saturday morning after having read in an English newspaper that in the German counter propositions the German Government expressed a wish to use the interned ships for business purposes (merchandise).

On Saturday morning he had read in another English newspaper that the Allies had rejected the counter propositions, and, therefore, that the original naval clauses would not be changed. In consequence, not being informed of the extension of time allowed for the signing of the peace terms, and believing that the armistice had expired, he had given the order to sink the ships.

At the beginning of hostilities he had ordered that no German warship should ever be surrendered to the enemy.

He declared that during his command of the interned ships he had been consistently fair and honest, and that he had been treated in like manner.

He would have sunk the ships whether the admiral had been in port or not.

In view of the evidence given below, it would seem that Rear Admiral von Reuter's decision was made in haste, and that he was influenced by two extraordinary errors, which, to my knowledge, were entirely unjustified:

(*a*) That his Government intended to use the interned ships for business purposes.

(*b*) That the armistice had expired.

The German losses, as far as can be computed, consisted of 2 officers and 6 men killed, and 5 men wounded.

APPENDIX.

Note.

The following translation of a letter from Rear Admiral Trotha to Rear Admiral von Reuter, dated 9 May, 1919, was found, during the work of rescue, on the German ship *Emden*.

Translation of a Letter from Rear Admiral Trotha, Chief of the Admiralty, to Rear Admiral von Reuter, Scapa Flow (9 May, 1919).

Chief of the Admiralty,
No. A. III 5332.

BERLIN, *May 9, 1919.*

VERY SECRET.

You have expressed several times to Commander Stapenhorst the desire of the interned ships (Intermierungs Verband) to be informed concerning their fate and of the date on which their internment would probably end.

The fate of these ships, which form the most valuable part of our fleet, will be decided, in all probability, in the preliminary peace negotiations now under way.

According to the press and to the statements made in the House of Lords, it appears that our enemies intend to deprive us of all interned ships on the conclusion of peace; they hesitate between destroying them or dividing them among themselves. The English, of course, raise objections to this second course.

These hostile intentions are contrary to the rights of ownership—a right which, until now, has been undisputed—of the Germans to these ships; we consented to the internment of these ships when the armistice was concluded only because we were obliged to agree to an appreciable decrease of the offensive power of the German fleet for the duration of the armistice.

This interpretation, openly stated, was not contradicted by the enemy when the armistice was concluded or when it was extended. Moreover, we referred to this interpretation when we protested, February, 1919, against the unjustifiable internment in this enemy port. We remarked that it was contrary to the terms of the

armistice, and requested that the ships be transferred to a neutral port. This protest remained unanswered.

You may rest assured that it will be the chief duty of our naval delegates at Versailles to safeguard the future of our interned ships in every possible way, and to arrive at a solution which will be in accord with our traditions and our incontestible rights. The first condition will be that the ships shall remain German and that their fate, whatever may happen under the stress of the political situation, shall not be decided without our having a voice in the matter; we must make the decision ourselves, and the surrender of the ships in the future is out of the question. We must hope that these just demands will take the place which they should have in our political attitude when considering integrally the question of peace.

I ask you, in as far as you are able to do so, to be so good as to express to the officers and crews of the interned ships the satisfaction that it is to me to know that they, on their side, so ardently share our natural hope that the interned ships will remain under the German flag; and will you please let them know of our wish that our just cause may triumph. These sentiments will be of assistance to the German delegates at the peace conference. The fate of the entire navy depends on the result of their efforts; we must hope that they will be able to put an end to this internment which, owing to the fact that our enemies have not kept their word, has become so cruel, and the suffering and trials of which are deplored by our entire navy; all honor is given to our interned crews.

To the commander in chief of the interned ships.

Rear Admiral von Reuter,
Scapa Flow.

[Copy of the translation.]

Commander of the interned squadron.

B. Nr. P. 40.

June 18.

(Transmitted) by a personnel officer.

A. . . . F. d. T. (12 copies).

1. At the signal given to all the captains, (sic group first paragraph Confirm Chief I. V).

Sabotage on the ships must begin at once. Fires (under the boilers) must be extinguished, turbines put out of service, auxiliary apparatus and searchlights destroyed; most important of all, the mechanism of the cannons and torpedo tubes must be destroyed.

2. To be left intact: Two boilers, one dynamo, Diesel dynamo, one searchlight, the apparatus for launching lifeboats, the windlass, the rudder, and life-saving apparatus.

The apparatus mentioned in paragraph 2 must not be destroyed until the signal is given.

3. Do not attract outside attention, and when communicating with trawlers do not exchange articles belonging to the Government, as this might attract attention.

4. This document must be taken in charge immediately by the captain, who will place it under key. It must not fall into the hands of the enemy.

(Signed) VON REUTER.

Receipt of P. 40 (12 copies) to be acknowledged immediately.

BRITISH LIGHT CRUISER SQUADRON IN FAR EAST.

Source: China Press.

22 October 1919.

Shanghai, August 28.—The light cruiser *Colombo*, which will arrive in the Whangpoo on Sunday, is a very recent addition to the British Navy, having been completed early this year. She has a displacement of 4,190 tons, is 450 feet long and 43½ feet beam, with a maximum draft of 16 feet 3 inches.

This warship, like all recent British light cruisers and torpedo destroyers, runs on oil fuel, carrying 950 tons of oil, which gives her a cruising radius of 1,250 miles at full speed, 28 knots an hour, or 2,100 miles at a speed of 10 knots an hour.

She carries five 6-inch guns, two 3-inch antiaircraft guns, four 3-pounders, and four double revolving torpedo tubes.

The three sister ships of H. M. S. *Colombo*, the *Carlisle*, *Capetown*, and *Cairo* will also shortly be on the China station, giving us a light cruiser squadron which for high speed and long cruising power combined with light draft and comparatively hard-hitting potentialities will be one of the best in the world.

INTERNATIONAL.

NOTES ON ECONOMIC CONDITIONS IN FOREIGN COUNTRIES.

Source: Reliable.

11 October 1919.

UNITED KINGDOM.

Labor.

The railway strike was settled on 5 October by an agreement between the Government and the railwaymen's executives. The terms of the agreement were: (1) Immediate resumption of work; (2) continuation of negotiations after resumption of work; (3) stabilization of wages at present level until 30 September, 1920; (4) minimum wage of 51 shillings for adult railwaymen until cost of living declines; (5) no victimization of strikers or loyal workers; and (6) payment of week's wages held back because of strike.

The consensus of opinion in London holds that the result was a Government victory. There are evidences that extremists in labor circles have lost prestige through their failure to bring about a general strike. Moderate labor opinion looks upon the railway strike as unfortunate.

There are indications that the labor situation has entered a stage in which the workers are recognizing the economic needs of the country as a whole. Revolutionary agitators are addressing smaller audiences. A campaign within the ranks of labor to increase production has been inaugurated. The work undertaken by the National Alliance of Employers and Employed in harmonizing the relations of capital and labor is making rapid headway. Still more significant is the action of the Federation of Engineering and Shipbuilding Trades and Amalgamated Society of Engineers in withdrawing their application for a 44-hour week pending an investigation.

Nevertheless, the chief causes of industrial unrest, the high cost of living, profiteering, and lack of housing are still in existence; and the Government finds that it must make a determined effort to remove or ameliorate them.

Coal.

The output of coal in the United Kingdom is still below normal; but the outlook is not wholly discouraging.

The act of Parliament providing for a seven-hour day in the mines went into operation on 16 July. It was predicted that the reduction of hours would cause a decrease in output of 10 per cent; and the output from 19 July to 23 August indicates the apparent fulfillment of this prediction. On the other hand, there has been a steady increase of production since 26 July, and the production for the week ended 6 September was not far short of the average for May.

The exports of coal in August were about one-third less than the average for the first eight months of 1919. United Kingdom exports of coal to Italy were in August 320,000 tons, as compared with a monthly average of over 800,000 tons in 1913. American exports of coal to Italy were in August 314,000 tons, as compared with a monthly average of about 28,000 tons before the war. British exports of coal to South America were in August 104,000 tons, as compared with a monthly average of 576,000 tons in 1913. United States exports of coal to South America in August were about the same as the British, although in 1913 coal exports from the United States to South America averaged only 37,000 tons a month.

There are indications that the miners are responding to appeals for increased production; but no predictions can be safely made until the question of nationalization has been settled.

FRANCE.

Trade.

In spite of the feeling against the former enemies of France, commercial relations between France and Germany are expected to develop on a large scale. Resumption of business with concerns on the left bank of the Rhine is particularly favored.

A new tariff schedule for dyestuffs and chemicals has been adopted by the Chamber of Deputies, which provides for free importation and Government distribution of German products covered in Reparation Annex VI of the Peace Treaty, and further licensing of all German imports and of those products in excess of the treaty amounts. The bill has been referred to the Senate.

Finance.

The bill ratifying the agreement recently reached between France and the United States for the purchase of surplus stocks of the American Army in France was adopted by the Chamber of Deputies on 10 October. The amount to be paid, $400,000,000, is to be represented by bonds dated 1 August, 1919, bearing interest at 5 per cent from August, 1920, maturing in 10 years, interest and capital being payable in dollars. The budget committee has approved the bill, but demands that the first interest coupons be paid in February, 1921, so that the budgets of 1919 and 1920 should not be called upon to support any burden.

Coal.

The railway branch of the Ministry of War is reported to have promised the municipal council of Paris that the crisis in the fuel situation would be passed in a fortnight. Canals in the war zone have been repaired, and the completion of demobilization will allow more railway cars to be run. The shortage of coal is being made good by the utilization of water power from the Alps, by a number of French industrial concerns. The substitution of petroleum for coal is also being seriously considered.

Reconstruction.

Captain Andre Tardieu has given out figures on the reconstruction work accomplished since the armistice. Of the 500,000 houses wrecked by shell fire 60,000 have been rebuilt; of the 3,246 kilometers of rail destroyed 2,016 kilometers have been repaired; and of the 1,075 kilometers of canals rendered useless 700 are again in commission. Of the 1,160 plants destroyed, 586 have been repaired. The devastated area embraced 3,500,000 acres. Of this approximately 1,000,000 acres have been returned to the farmers, and 500,000 acres are ready for seed. Ten million meters, over 6,000 miles, of barbed wire have been disentangled and carried away in the operation. The yield of taxes, which was five billion francs in 1913 has been raised to 12,000,000,000 francs in 1919.

BELGIUM.

Trade.

Belgian exports are increasing, especially as regards coal. The bulk of coal exports is being sent to France. The transportation system is rapidly approaching normal. The canal system, which is especially important to the agricultural interests, is being rapidly repaired. The port of Antwerp is reported as very busy.

Finance.

It is expected that within a few days the terms of the $50,000,000 Belgian American loan will be announced, as all arrangements have been concluded. It is understood that the loan will consist of long-term bonds at 6½ per cent and will be offered by a syndicate headed by J. P. Morgan & Co. and the Guaranty Trust Co.

SPAIN.

The eight-hour working day, declared by royal decree, went into effect quietly in the majority of factories on 1 October.

Severe storms and floods in southeastern Spain, together with strikes in various other parts of the country, will doubtless have an effect on the economic situation.

PORTUGAL.

The financial condition of Portugal as a Government is very bad and bankruptcy stares it in the face. The hope that reparation would offset the expenditures of the war have failed to materialize.

ITALY.

Coal.

Italian railroads are reported to have fuel sufficient for only one month's operations, entirely American. The accumulation of American coal was hampered by the harbor strike at Genoa, where prior to its settlement 18 coal steamers await unloading. The Government has contracted in the United States for 2,000,000 tons of coal. The daily shipment of 5,000 tons of German coal promised by France and Switzerland has not been delivered because of the lack of transportation.

Trade.

Sugar importers in Trieste report that, owing to the large Bohemian crop, American competition will be rendered impossible.

The local government of Trieste has authorized the customs house to grant export licenses for quicksilver.

There is a tendency to trade with Germany, partly due to resentment against the United States for its attitude toward Fiume, and partly because of the low price of German exchange. The Italians are reported to be speculating heavily in marks, with a view to a rise in their value.

A large increase in Italian trade with South America, as compared with prewar trade, is indicated by recent statistics. A new line of steamers has been opened between Italian ports and Peruvian and Chilean ports, via the Panama Canal.

Finance.

The finance committee of the Chamber of Deputies of the Argentine Republic has advised a credit jointly and severally to the Governments of Italy, France, and Great Britain for 200,000,000 pesos in gold, for two years, at 5½ per cent interest. This will be applied for wheat and maize, to at least 75 per cent of the sum, and other Argentine products for the remainder, all to be shipped before February 29, 1920.

Miscellaneous.

Emigration from Italy is expected to increase greatly, according to reports from American consuls. The United States is the preferred country, but a large movement is indicated to South America.

The shares of navigation companies in Venetia Giulia are no longer to be considered foreign shares, according to a local government de-

cree. This is regarded as an indication that the Trieste mercantile fleet will be handed over to Italy.

The metal workers' strike at Milan ended, the strikers obtaining an increase in pay.

Food is reported scarcer in Italy and prices increasing.

GERMANY.

The Frankfort import fair, which was opened on 4 October, had a larger display of German goods than of imported articles. A special feature of the German products is the large exhibits of steel and iron goods, machinery, tools, and cutlery. The imported goods are largely those which were introduced into the occupied territory.

At the Leipzig fair 7,000 foreign buyers were reported present. Machine tools constituted the best exhibit, followed by mechanical toys. Plentiful neutral orders for porcelain crockery were reported, but the lack of coal is hampering the manufacture.

Finance.

Germany will issue a 5 per cent premium loan of 5,000,000,000 marks, the interest on which will be payable only with the principal on the redemption of the loan. Inducements will be offered to purchasers in the form of bonuses and drawings with a number of prizes of 1,000,000 marks.

AUSTRIA.

Finance.

The Minister of Finance has presented a program by which he expects to rehabilitate the finances of Austria within four years. The scheme involves taxes on incomes and inheritance and also compulsory wealth contributions. Heavy taxes will be placed upon alcohol, tobacco, and luxuries.

The financial problem will be the first business submitted to the Austrian National Assembly when it meets on 14 October. It is reported that subscribers to foreign and internal Government loans will obtain certain exemptions from the compulsory wealth contributions. The proposal to scale down the currency by devaluing the notes in circulation will probably not be adopted.

The Government announces that it will sell Government art treasures, including the famous Gobelin and Flemish tapestries from the royal castles, which are now being listed and appraised.

Miscellaneous.

The fuel situation is again so acute that the Government has limited the running of street cars to two hours on week-day mornings. Restaurants are closed at 8 o'clock, and theaters at 9 o'clock. The Vienna municipality has decided to purchase 80,000 tons of American coal for use in the municipal electric lighting works.

All foreigners are leaving Vienna by official order. Arrangements are being made to increase the number of trains in order to expedite the exodus.

CZECHO-SLOVAKIA.

Trade.

A convention has been ratified between Czecho-Slovakia and Venetia Giulia regarding shipment of goods and passengers through Trieste. Under this arrangement commercial relations between the Trieste hinterland and overseas will be renewed through Trieste.

Finance.

Czecho-Slovakia has issued its own paper currency in place of the former Austro-Hungarian notes.

The Prague Credit Bank, formerly capitalized at 50,000,000 crowns, has increased its capital to 100,000,000 crowns, the new shares being taken over by a syndicate composed of the Societe Generale Paris, Banque de Paris et des Pays-Bas of Paris, Credit Mobiler Francais of Paris, Rotterdamsche Bank Vereninigung of Rotterdam.

JUGO-SLAVIA.

Oil Machinery.

The oil monopoly purchased more than $3,000,000 of products from the Standard Oil Co., of New York last summer. About 10 September, it gave a Treasury note, due 1 November, for the balance.

Crop Estimate.

The wheat and corn export crop is estimated at 1,000,000 tons.

Finance.

The establishment of an American Jugoslav National Bank under the Federal reserve act is being actively undertaken.

The creation of a fund of 500,000,000 dinars to guarantee the accounts of Jugoslav importers is regarded by the Ministry of Finance as almost certain of success.

ROUMANIA.

Crop Estimates.

The wheat export crop of Roumania is estimated at 50,000 carloads. Another estimate put it at 500,000 tons, against 1,700,000 tons in prewar days.

Export Tariff.

The export duty in Roumania, applicable to all articles except oil products, is 20 per cent. An aditional 2 per cent is required for a license to export.

BULGARIA.

Grain Loan.

The Bulgarian Legation is attempting to float a $5,000,000 loan for one year, offering as collateral the gold of like amount en route to America to be paid to the United States Grain Corporation. The proceeds of the loan will be paid to the corporation.

TURKEY.

Finance.

The Turkish Minister of Finance has stated to a French journalist that the annual deficit of the Turkish Government will be about $30,000,000. He contemplates a further increase in import and export duties. The Government has met the deficit by borrowing $40,000,000 from the Imperial Ottoman Bank, in which British influence is strong.

Canning Industry for Palestine.

The Zion Canning & Preserving Co., of Delaware, has just been organized to erect a fruit cannery in Palestine.

Our quarterly trade with Constantinople, in value at least, exceeds the prewar figures.

Censorship.

Censorship of mail to the United States has been abolished; but mail from America is still censored, due to revolutionary activities of Greeks here.

Fig Trade.

The United States Department of Agriculture reports that the 16,000,000 pounds of figs normally shipped from Smyrna to America will find increasing difficulties in this market. California's product of Smyrna figs this year is about 4,000,000 pounds; and during the war, when importations were suspended 10,000 acres of fig orchards were planted in the San Joaquin Valley. Movements for a protective duty usually follow such developments, which may affect trade treaty negotiations with Greece.

PERSIA.

Cost of Living.

Cost of living in October compared with 1914 were as follows: Rent 200 per cent, native food 400 per cent, imported food 700 per cent, clothing 400 per cent, fuel 500 per cent, light 400 per cent, servants 300 per cent. The kran has depreciated about 50 per cent.

POLAND.

Danzig Port Equipment.

A trip of inspection at Danzig by Polish and American officials has disclosed the fact that a good deal of the small equipment of the

port is being removed, either by direction of German authorities or by theft. It is feared that attempts will be made to take the large steel floating docks, and that little will be left to turn over to Poland when the high commisisoner is finally appointed.

Railways.

It is reported that the Polish Government now operates all the railways of the country, 5,606 miles being under civil authorities and 1,504 miles under the Polish War Department. Total mileage in operation 7,000 miles.

RUSSIA.

Strikes in Petrograd.

Definite information of great labor strikes in Petrograd last July has now been published in Bolshevik papers. Military forces were used, and the entire population was disarmed. The Bolsheviki have listed all the alleged opponents of the Soviet régime. Anyone inscribed on the "black register" is deprived of his food card.

Foodstuffs in Petrograd.

The amount of foodstuffs available in Petrograd may be judged from the number of cards issued to the adult population during 18–20 June, which amounted to 834,236. There were also issued 272,316 cards for children.

The budget of the provincial food commission for the first half of 1918 reached the sum of 1,625,601,342 rubles. The cost of transportation of food, maintenance of city and district food commissions, and of 46 food detachments was about 98,400,000 rubles; the remainder was spent for the purchase of foodstuffs and supplies.

Coal Production.

It is learned that the production of coal in the Donetz Basin during January and February, 1919, was 20,008,000 poods. By comparison with 1918, the production of coal declined 50 per cent under Bolshevik administration. The number of miners in the same period is said to have diminished by more than half. The official *Izvestia*, of Moscow, declares that the danger lies not merely in Denikine's successes, but principally in the progress of the industrial paralysis, verging toward national desolation, now that Soviet Russia has neither iron, coal, cotton, nor petroleum.

Omsk State Bank.

The assets and liabilities of the State Bank on 1 August, 1919, reached the sum of 7,586,243,000 rubles.

Petroleum Restrictions Removed.

The Omsk Ministry of Commerce and Industry has removed former import prohibitions of petroleum and its products, retaining only the function of control and supervision.

Kolchak Outlawed.

The Bolshevik Council of People's Commissaries has posted publicly measures to be enforced in regions abandoned. The decree annuls all deeds of sale or purchase, contracts or treaties, and all concessions made by the Kolchak Government, at home or with foreign powers. It grants full autonomy and self-determination to Siberia.

Latvia Seeking British Aid.

It is reported that the Minister of Finance of Latvia, who is in London to negotiate for munitions and financial aid, has been informed that while the British Government was against supplying Latvia financial or further material aid, it had no objection to his negotiating with private firms.

EASTERN SIBERIA.

Export Commodities.

For the purpose of securing money for the purchase of supplies, various goods with an estimated value of 5,000,000 yen (approximately $2,500,000) have been offered by the Siberian Government at Omsk to a Danish company known as the Siberian Co. These supplies consist of coconut oil, coffee, copper, cotton, rubber, and saltpeter. This company desires to establish a credit with the American bank at Vladivostok for handling the transaction, with the expectation that the coffee, saltpeter, and coconut oil may be shipped to America.

MANCHURIA.

Chinese Eastern Railway.

Semenoff, the Cossack leader, is moving troops occupying stations on the Chinese Eastern Railway. If he succeeds, it means that the Japanese will control that railway, an important link in the trans-Siberian road. It is reported that the Chinese commander declares he will force Semenoff out, but it is thought that this is doubtful.

The Russian Press in Harbin is speculating on what compensation should be made Japan for continued assistance to the Omsk Government. Various economic privileges and concessions are suggested as possible compensation. Anti-American propaganda is becoming more general and more effective.

CHINA.

Shipbuilding in China.

Another industry which has been developing rapidly in China (glass blowing and electrical apparatus have been mentioned in these notes) is shipbuilding. Within a few months there have been reports that the Kwang Nam Dock Co. has reclaimed land and established a shipyard at Canton and completed two of the largest vessels

ever built in China (of only 1,516 and 2,000 tons, however). The Han Yang Ironworks have been producing ship plates which have been used in large quantities in Japan and China. The shipyards at Shanghai have been modernized under the influence of the war and are said to be capable of doing as good work as any European yard. One of these, largely under American influence, has extended its plant over nearly a mile of river frontage. A Chinese company is equipped for building four 5,000-ton ships at once. The greatest growth has taken place at Hongkong under the stimulus of war-time orders from Norwegian and British sources. Vessels of 1,000 tons have been produced at a speed and at price comparing favorably with work in Europe.

JAPAN.

Shipping.

A recent report shows the total number of ocean-going Japanese steamers in excess of 1,000 tons to be 703, with a total gross tonnage of 2,005,017. The Nippon Yusen Kaisha is building several 30,000-ton ships for use on the American and European lines.

Labor.

Industry has not recovered from the shock of the labor trouble which came so precipitately in July. The average frequency of strikes during the last few months has been about twice that of the corresponding period of last year. While in nearly every instance amicable adjustments have been effected, the concessions made labor were regarded as burdensome. With no curtailment in living costs, employers fear that now that labor has tasted of victory and realized the power of united action further demands are inevitable.

Rice Situation.

The Japanese Government's attempts to alleviate the rice situation have proved futile. The official sales of Government stocks of imported rice, totaling 100,000 koku (1 koku equals 5 bushels), caused scarcely a ripple in the market. The free transportation of rice on the Government railways also proved an ineffective measure and was terminated recently.

MEXICO.

German Colonization.

Press reports state that the "Mexican German Colonization Co.," with a capital of 4,500,000 marks, has been formed to purchase agricultural lands for German settlers.

Petroleum.

Oil shipments from Tampico during August surpassed all previous records, amounting to nearly 8,000,000 barrels, of which 6,000,000 were shipped to the United States.

MEXICAN NOTES.

Source: Reliable.

18 October 1919.

It is reported from The Hague that the Mexicans, Gen. A. Breceda, Alberto Pani, and C. Gaxiola, are staying in a small hotel in the environs of that city and claim to have important business in Germany, where they intend going. They have been in conference with German munition dealers in Holland as well as with the Vickers Co. It is reported that Schiff, the Berlin banker, had been in touch with them and had expressed his willingness to sell them quantities of army supplies, but all their attempts to make purchases of war materials from German firms had been blocked.

The Legation at Tegucigalpa under date of 31 August, transmits to the department 12 books and pamphlets which the Mexican Legation in Honduras has been distributing, presumably for propaganda purposes.

In content these publications are innocuous and unobjectionable. For the most part they consist of President Carranza's annual messages to Congress, together with the congressional reply thereto, as well as copies of communications to and from the Mexican Foreign Office, which have already been made public.

With further reference to the refusal of the Mexican Government to comply with the request of the Executive Committee of the League of Nations for information on Mexico as stated in the report of 11 October, the *New York Times* of 10 October publishes two reasons which are assigned by the papers for the refusal. First, Mexico, not being invited to become a member of the league, does not feel that she is called upon to extend any favors to that body. Secondly, the league is not in force, and even though Mexico was inclined to furnish the requested documents, it must necessarily wait until the league has been constituted as a legal and official organization.

A press dispatch from Mexico City (11 October) says the official announcement has been made that the passports of British subjects are now being viséd by Mexican consuls, and that the same procedure is being observed by British consuls with reference to passports of Mexicans. The unofficial announcement is also made that the diplomatic relations between Great Britain and Mexico have improved to the extent that an early appointment of diplomatic representatives by both countries is not considered improbable.

The Mexican Diplomatic Mission in Paris, nominally headed by Candido Aguilar, is reported to be endeavoring to purchase munitions of war. This will be impossible in France, as the Government is supervising the purchase of all arms and munitions. Members of

the mission are reported to have visited Switzerland, where they had relations with citizens of Germany. The important member of the mission is said to be Gen. Breceda, who has close relations with Barragan, Carranza's chief of staff.

There will be held in Washington 12 January, 1920, a Pan American Congress, at which will be present representatives of all the nations of the Continent. On this date the chambers of commerce, as well as their Governments, will send delegates. It is reported from Mexico City that the Mexican representatives will present a printed study, which will be called Annals of Commerce and Industry in Mexico, which will cover a period of 10 years previous to the date.

The New York American, under date of 16 October, publishes the statements of Senor Jose Maria de la Garza, minister for Mexico to Norway and Sweden, made in New York during an interview, in which he is quoted as saying, "The United States is manifestly destined to be the greatest nation of all time, and it is the heartfelt desire of Mexico not only to be the best of friends with the United States but also to promote the stupendous evolution of her people and her prosperity. Mexico and the United States are next-door neighbors and natural allies. We depend almost exclusively on American importations. You need the raw materials of our mines, fields, and wells. It is our instinctive desire, and it is the paramount interest of both nations to be absolutely cordial with each other."

In an interview granted the *New York Tribune* and published in that paper 16 October, Ambassador Bonillas is reported to have stated that it is the belief of President Carranza that the troublesome oil question would be settled so that justice would be done the oil companies and the Mexican nation and that there would be no ground for complaint. He stated that the Mexican Congress was making an honest effort to settle the questions in a just way.

Internal Conditions.

The American ex-consul general to Mexico, George A. Chamberlain, is reported in the *New York Times* and *World* of 9 October as being engaged in writing a book on the Mexican situation called Not All the King's Horses. Mr. Chamberlain in an interview in the above papers takes pains to point out that his book expresses merely his own individual views and that the Department of State is in nowise responsible for them. He takes what may be properly termed a radical view of the Mexican situation, which he describes as being "intolerable" and "worse than the news reports indicate." He intimates that he has a "possible solution" of the problem, but the interview does not intimate what it is. The book has just been placed on sale.

The American consul at Salina Cruz reports with respect to the murder in his district of an American citizen named Herbert S. MacGill, that the Mexican authorities have up to the present failed to take any steps to investigate the matter. MacGill was shot in August last by cattle thieves.

A press report from Laredo (10 October) states that Luis Caballero, leader of the forces in opposition to the Carranza Government in the State of Tamaulipas, has asked for amnesty, agreeing to lay down his arms. The same dispatch says that two of Gen. Manual Palaez's lieutenants operating in Tampico, Marcelo Caresto and Francisco Medrano, have made similar proposals.

The *New York Times* of 12 October states that Francisco Villa and Felipe Angeles are preparing to launch another campaign against the Government of President Carranza. No more attempts will be made, the dispatch says, to take the frontier towns because of the fear of provoking the retaliation of the United States. Mexico City will be the object of the next campaign. On the other hand, Gen. Manuel Dieguez, commander of the Chihuahua zone, in an interview (11 October) predicts that the Villa movement will be entirely crushed by 1 January, 1920. Villa, he asserts, is now at San Bartolo (Durango) with only 80 men.

Plans for the smuggling of a large quantity of silver bullion, value not known, that has been buried in Mexico by Villistas for a year or more, has come to the attention of the American authorities.

The American consul at Guaymas reports that it is expected in the near future that colonists, the majority of whom are Germans, will settle in the Yaqui and Mayo River valleys.

It is reported from Nogales, Sonora, that President Carranza has established a censorship on cinematographic representations in the Republic.

During the month of August there passed across the line at Nogales more than 2,000 laborers en route to the Imperial Valley in California and Salt River Valley in Arizona, to work under contract in the cotton fields.

Gov. Estaban Cantu, of the northern district of Lower California, has closed the great gambling house "Tecolote" (Owl), at Mexicali, which has paid in licenses $3,000 per month to the district government.

Mr. Paul Kittewiki, representing a large American company with ample funds, has applied to Gov. Cantu, of Lower California, for a concession to establish at Tia Juana, near San Diego, a large brewery, with all modern improvements, to cost $1,000,000.

It is reported from Sonora that Gov. De la Huerta has instructed the mayors of the various municipalities throughout the State to

give foreigners every protection and consideration. He has undoubtedly saved the school system in the State from total disintegration by paying the school teachers their back salaries, according to the report.

Due to the necessity which exists in the north of the Republic for rapid repairing of all kinds of machinery, the American Smelting & Refining Co., has arranged to establish in the State of Chihuahua a department destined exclusively for repairing machinery. The workshops of this department, it is said, will be the first of the kind in the whole Republic, since they will contain the most modern mechanical appliances. The opening of this department will save the freight expenses and customhouse duties paid when they send machinery to the United States.

From Nogales, Ariz., it is reported that Gen. Obregon contemplates a military movement should his candidacy for President be seriously opposed; that he has a large quantity of arms and ammunition stored in Hermosillo, Sonora, preparatory to such a move.

It is known that division Gen. Pablo Gonzalez, presidential candidate, will withdraw from the military service the beginning of next month to devote himself to politics.

From Mexico City it is reported that a large group of business men, merchants, and public men were taking the first steps to organize a party which will launch the candidacy of Senator Carlos B. Zetina for first magistrate at the next election. In an interview with the third presidential candidate he expressed himself as follows: "I will do all in my power to fulfill loyally and patriotically the sacred obligations imposed by the will of the people for the country." The motives for selecting the senator were, it is stated, first, the well-known honesty of the senator, and, second the fact that he is one of the persons most likely to be able to serve the purpose immediately among the revolutionary group—persons who are reactionary, who also insist on the right of being represented, since they form a large part of the population of the country.

"On the 30th of September in connection with the matter of the charges against the governor of Hidalgo, in the House of Representatives, Deputy Leal made a sensational speech, in which he openly charged that the troubles in Guanajuato, Queretaro, and San Luis Potosi are not due to the governors and they are not the least to blame, as the real creator of all the trouble is Carranza, who has systematically violated all democratic principles. That the governors in acting as they do show that they are only disciples of Carranza."

Even in his native State President Carranza has apparently lost his prestige, according to information from Satillo, Coahuila. In a

dispatch of 8 October, the consul reports the arrival of the President and the apathetic interest of the populace on the occasion. Much money was expended in preparing for the visit.

The governor of Coahuila has been with the President during the preceding two weeks and desired to show due courtesy to the chief executive, but Carranza is reported to have only departed from the environs of the location of the troops a short distance, for it is said that he did not deem it safe to go to the palace.

The revolutionary leader Raul Madero, who was banished to the United States for some time and who has just been pardoned by a decree of the President, is reported to have been at the railway station at Monclova when the President departed, for the purpose of "showing his appreciation (on being pardoned) to the President himself."

Col. Augustine G. Cevallos, formerly a Mexican Army officer, who was taken into custody at Los Angeles, Calif., on the extradition demand of the Mexican Embassy, on the charge of embezzling $30,000 from the Mexican Government, states, according to the *Washington Star* of 15 October, that his arrest was the result of politics.

At the recent session continued by the Chamber of Deputies, the Obregonists obtained another triumph since their candidates for treasurer of Congress, to be presented to the Senate, secured the majority of votes. Felix A. Salinas, Roderto Aeevedo, and Rafel M. Saavedra were elected.

In response to questions submitted to him by Mr. Hunter, representing the *Chicago Tribune*, Gen. Alvaro Obregon, of Sonora, candidate of the National Cooperatis Party for the Presidency of Mexico at the coming elections, made in general the following answers:

That Felix Diaz is at present marauding in the State of Vera Cruz, but his followers are so few that he has been unable to capture any city of importance in said State, his activities being confined to the attack of small country places, according to reports issued by the War Ministry.

He further answered that the majority of the States of the Republic are under the control of the Government headed by Venustiano Carranza, and in the remainder there are rebel bands which do not control any fixed zone, as they are always marauding from place to place attacking trains or small ungarrisoned towns, avoiding the government troops.

Relative to his opinion of article 27 of the Queretaro Constitution on oil legislation he refers to his "manifesto," quoting "*full acknowledgment of all legitimately acquired rights by all foreigners in Mexico, according to our laws.*" (Manifesto C. International policy.)

He would not venture an opion on the League of Nations, stating that the advantages and disadvantages of the league had not been clearly determined even in this country.

He expressed his belief to be that "within the very near future" Mexico will be in a position to resume payment of its foreign obligations, and that if he were President of Mexico he would not attempt to ignore any legitimate foreign obligations Mexico may have contracted.

It is possible to establish order and a stable government in Mexico without outside help if the countries friendly with Mexico would enforce their neutrality laws, according to the general's answer to a question so framed for him and he further stated that he and all his countrymen would resist foreign armed intervention.

With regard to his attitude toward foreign capital in the development of Mexico, he quoted from his "manifesto" as follows: "*Will give all facilities and encouragement to capital that may seek investment in the development of our mineral resources, always bearing in mind the most practical and equitable form of conciliating the interests of capital, labor, and our country's revenue.*"

"The charge that I am anti-American could not be farther from the truth," he stated, "and I can not have but a cordial sympathy toward the American people."

He has no accurate information or exact figures on the number of bandits operating in the States of Mexico but stated that it may be inferred that the rebels are very much decreasing since the present administration is practically in control of all the railroad lines and of towns and cities of importance in the Republic.

He stated that he was not aware of the number of German and Japanese immigrants that have come into Mexico since the signing of the armistice, as he had no official connection with the present administration in Mexico, who, he stated, would be in a position to furnish such data.

Military.

The Federals in Sonora continue their wholesale desertions, according to reports received from that quarter. In many cases the garrisons are practically denuded; at San Miguel, for instance, the only troops are a captain and two lieutenants, who, nevertheless, continue to draw pay for 25 enlisted men.

Gen. Juan Montano, who accompanied the late Gen. Aureliano Blanquet into Mexico City to join Felix Diaz in April of this year, is reported to have been at El Paso, Tex., recently for the purpose of organizing another revolutionary expedition into Mexico and to buy arms and ammunition for the Felicistas, whose headquarters are

reported to be now located in Sierra Norena, Canton of Jalapa, Vera Cruz.

The claims of the Federal Government that they have an army of 10,000 men in the Huasteca district in the State of Vera Cruz in the territory between Tampico and Tuxpam is discredited by information from a reliable source. There are less than 300 soldiers of all kinds in this district. The remaining 7,000 are on paper only; while the commanders draw full pay for the number on paper, the difference goes to increase the commander's personal account.

The personnel of the Pelaecista army is not made up of paid men, but is composed of ranchers or landowners. This accounts for the fact that they do not maintain a large force in barracks or at posts. When a call is sent out for men to oppose the invasion of their territory by Federal troops men controlled by landowners are depended upon.

Economic Conditions.

A dispatch from Mexico City (7 October) states that the Senate petroleum bill was defeated in the Senate, the vote being 26 to 17. The measure proposed by the executive was brought up for discussion in the Senate 7 October.

A dispatch (6 October) from Progresso transmits the text of a new law promulgated by the legislature of Yucatan on 3 October, decreeing the dissolution and liquidation of the Comision Reguladora de Mercado de Henequen. The law became operative 6 October and confers upon the executive authority to appoint three liquidators, who, subject to the general supervision of the executive, are to assume full charge of the affairs of the reguladora, collect all debts due it, pay all debts owed by it, market the unsold stocks of fiber in warehouses in Merida, Progresso, and Campeche, and redeem and retire the issue of paper money amounting to $10,000,000 which it placed in circulation under the decree of 13 May, 1919.

The consul reports that the money of the reguladora has depreciated in value until it is quoted at 5 pesos to the dollar and that the public does not care to receive it even at that figure. Hard money is scarce and a lack of small coins greatly hampers business transactions. As a protest against the new measure, the consul says that the National Chamber of Commerce of Yucatan, of which all the principal merchants are members, have closed their establishments and asked the protection of the military authorities against possible looting. No serious disturbances had taken place when the dispatch was mailed.

All members of the Legislature of the State of Yucatan agreed, under compulsion it is stated, to vote immediately for the repeal of the law.

This law met with irresistible opposition, and the disturbances arising out of this opposition caused loss of life and damage to property, it is reported.

The American consul at Guaymas reports (6 October) that the salaried employees of the State of Sonora receiving more than $50 were reduced 10 per cent, effective 1 October.

THE SYRIAN QUESTION.

Source: Reliable.

14 October 1919.

While of relative unimportance compared with the vast economic and territorial questions involved in the treaties with Germany and Austria, the problems relating to the Near Eastern settlement have a prime importance in their bearing upon relations and rivalries among the principal Allied Powers. While England and France can agree without much difficulty in regard to the provisions of the German treaty, their interests as individual nations at once clash when it comes to deciding what shall be done with the Ottoman Empire. Turkey has been the cause of many historical tragedies in the past, and it now begins to appear that she may be the cause of many more in the future.

Today the future of Syria is one of the most troublesome questions concerning the former Ottoman territories. For centuries the French have claimed to possess special rights and sympathies in Syria and among the Syrian population, and there is no doubt that her claims were well justified. One of the rare cases of effective intervention by a western European power on behalf of one of the Christian races in Turkey was the French action in 1860 in coming to the aid of the population of Lebanon. French churches and schools have had much to do with the development of Syria, and French investments there are considerable, much larger than those of any other nation at the present time.

In 1914 it is probable that almost the entire population, including all racial elements, would have welcomed French rule in one form or another. During the war various factors have arisen which now tend to cancel this attitude of the Syrians and Arabs. One event was the hanging of many prominent Syrians by Djemal Pasha, principally and directly upon evidence found in the French consular archives in Syria, all of which should have been destroyed had ordinary prudence been exercised. After the armistice the French consular official who was sent back as French high commissioner was the former consul general in Beirut, Picot, whom the families of the hanged men consider as responsible for the treatment accorded to their relatives.

Much more important than this factor is the spirit of nationality that has been aroused in the Arab Moslem population which forms the majority. The movement that started in the Hejaz by the recognition of King Hussein has had, and will continue to have, marked and deep influences upon the Arab world, the end of which has not yet been seen. The British as well as the French may some day regret their calling upon the help of the Arabs against the Turks.

Right after the armistice and before the country was occupied by Allied troops, local governments were formed by the local Arab population, often with the knowledge and connivance of the Turkish officials before their departure. The flag of King Hussein was even raised in Beirut for two days before the French and British occupied that city.

The British military command has extended all over Syria and Cilicia, although in certain specified districts the French have their local control and the Arabs theirs. Whenever the Arabs have acted in a fashion hostile to French interests, as has occurred in several places, the French have either attributed this to the influence of the British, or at least to their tacit approval of the Arabs' actions.

The result of all this friction has been to make the French feel that the British representatives were working against them in a region that was recognized by the Treaty of London and by the Sykes-Picot agreement of 1916 as distinctly belonging to the French. In individual cases among the British this unfriendly attitude may have been observed, although most observers state that the British have not tried to work against the French, thus influencing the natives against the French cause.

The visit of the Crane-King commission in Syria is said to have been opposed by the French, because it would give the nations unfriendly to them a chance to put their sentiments on record, in manifest contradiction to the French claims that the native population was solidly for them. It developed in the hearings before this commission that the vast majority of the Moslems and Greek Orthodox and Jews were against the French, and that was the only element really strongly in their favor were some of the people of Lebanon.

The French have apparently not been wise in their methods in trying to suppress anti-French tendencies, and here as elsewhere in the Near East, their somewhat arrogant attitude since the war has alienated many former friends and supporters. This attitude is especially prevalent among the lower grades of officers, who do not seem to measure up to the prewar standards of French officers. It has also worked disastrously in Constantinople, Roumania, and Southern Russia.

Although the local representatives of the French and British Governments have tended to come into conflict in this disputed

region, the home governments have always seemed to want to pull together, the British showing every desire to respect French special claims in Syria.

On September 6 and 9 the London *Times* published articles on Syria and the present situation dated about 20 years earlier. An article in the *Bulletin de l'Asie Francaise* by Vicomte Robert de Caix furnishes the text for the comments of the *Times* special correspondent. It is a prolonged and serious indictment of British good faith in Syria, and begins by stating that France is a candidate for the Syrian mandate, and that the French people set much store in obtaining it, owing to a long and powerful tradition. Mr. de Caix states that a systematic campaign has been conducted by the agents of British policy against the securing by France of this mandate, although by the Sykes-Picot secret agreement of 1916 the British pledged themselves to leave Syria as a sphere of French influence. He argues further that this agreement was a fradulent document, for its provisions were contrary to a previous agreement made in 1915 between the British and the King of the Hejaz the contents of which were not communicated to the French. The British now seek every means of escaping from the Sykes-Picot agreement, and show a desire to stand by their agreement with the Hejaz Government.

After taking up in further details the arguments presented by Mr. de Caix, the *Times* correspondent replies that the truth of the situation is far other than the French writer believes it to be. One of the principal weaknesses of British policy is the secret diplomacy of the war, when the secret diplomatists banked so little on victory that they did not only distribute pledges right and left in seeking aid, but they did not even take the trouble to avoid contradictions in these pledges. The unfortunate Sykes-Picot agreement not only conflicted with the agreement with King Hussein, but caused the Italians to be discontented, and was an entirely indefensible proceeding.

The problem for the British is therefore one of combining their pledges to the Arabs and their pledges to the French. It is claimed by the *Times* writer that Gen. Allenby had a definite program leading toward this end, to be applied pending the decision of the Peace Conference. His command was divided into four zones—O. E. T. A. (occupied enemy territory administration), north, west, east, and south. The south is Palestine; the north is roughly the vilayet of Adana; the west runs from a point between Acre and Beirut to Antioch, and has the crest of the Lebanon for its eastern boundary. The north and west zones have each a French administration. A Turkish administration under British control, supervised directly by Gen. Allenby's general headquarters, covers the region of Marash, Aintab, Birejik, and Ourfa, and is not included in the four main

zones. The east zone extends from Aleppo in the north to the kingdom of the Hejaz on the south. The crest of the Lebanon, the Sea of Tiberias, and the Dead Sea are its principal western boundary. In this zone, which has its capital at Damascus, there is an Arab administration under Prince Feisal.

The French proposal is that there should be an Arab kingdom or principality which should include at least O. E. T. A. north, west, and east (also the vilayet of Diarbekir). Each of these Provinces should have a special measure of autonomy under French supervision. The head of the whole should be Prince Feisal and the mandatory power France. This project had the real support of Gen. Allenby, a French administration being set up at Beirut, in the Lebanon, and in Cilicia. In the east zone there are very few British troops, and the officers in liaison with the Arabs have standing instructions to cooperate with the French and to facilitate the eventual arrival of France as a mandatory if and when the conference so decides.

The *Times* correspondent states that he has satisfied himself that these British officers are acting in the sprit of these instructions, and declares that the charges of Mr. de Caix are devoid of all real foundation. He believes that the French feeling on these points is due to the undoubted touchy and excited state into which the junior French officials (and he suggests that many of them are too junior for their high responsibilities) have been brought by finding themselves in a country which they believed to be friendly and enthusiastic and which they find to be actively hostile and suspicious.

In his second article the representative of the *Times* says that he does not know whether it ever was, or now is, possible to carry out the program of a French mandate for the whole of Syria. The best chance would have been to assume that it was inevitably right after the armistice, when British troops would have been replaced by large numbers of French troops, and when the whole administration would have been turned over to France. If the French are to try to carry out their plan, the British should at once withdraw and let them tackle the proposition alone.

At the time of the armistice the French did not even dimly realize the number or the quality of the troops they would require. If the British were to withdraw, many military observers estimate that the French would require 100,000 men to hold the country. There is no mistaking the reason why such a large force would be required. It is simply the issue between the Moslem and the Christian. The prospect of an Arab Government never filled the Syrian Christian with anything but unbounded dismay. This writer believes that all the Syrian Christians, with but very few exceptions, want the French because they feel that the French would champion their cause against

the Moslems, while the British are felt to have too great a weakness for the Moslems. The Christians certainly want the French, in his opinion.

With an almost equal unanimity the Moslems do not want them. Best of all they would like to rule their own Government. Failing that, they demand the British or, better still and as a new idea, some remote power such as America. The reported Arab anti-French manifestations are all true. The Arabs are armed, and many of them have three rifles. From Prince Feisal down the Arabs give the same reply. If the French want Damascus they must take it. If they are driven out they will try to maintain themselves in the Hauran and to the south.

The *Times* man does not find among British officers the impression that this is bluff. If the French really make up their minds to take the country they can do so, but the British military men seem to fear some sort of futile compromise, which would divide up the country and open the way to continual friction. Many British officers feel so strongly the unity of this territory that they say that if the French are to have Syria they should have Palestine as well. To the Arab also Palestine is part of Syria and will be claimed by him.

In conclusion, the observer of the *Times* expressed the opinion that there is a large element of bluff in the Arab claims and menaces, and feels that some working arrangements can be reached during the visit of Prince Feisal to Paris.

The exact nature of the new arrangement that has been reached at Paris is not yet known. It provides in a general way for a more extensive military occupation and control by French troops, and yet it appears to have satisfied Prince Feisal, who recently telegraphed to his representative at Beirut not to worry about reports in the newspapers as everything had been satisfactorily arranged. One point of importance appears to be the acquiescence of the British in the French sending troops to save Armenia, the French interpretation of that term extending only as far as Malatia (in line with the French desire to include the vilayet of Diarbekir in their zone).

The American consular officers at Beirut and Damascus have forwarded a number of reports which they have received to the effect that the natives do not want French control; that there will be armed resistance to any attempt now held by the Arabs; that the natives state that they are not in the same class with the people of Algiers or Tunis, and are able to run their own Government; and that it is generally felt that the French do not to-day possess the capital necessary for the development of the country. The prefer-

ence of the mass of the population is said to be for America or for Great Britain as a mandatory power.

The Crane-King commission has, in general, made recommendations against admitting the French claims to Syria, and has stated its conclusion that the mandatory power should not be France. This commission has come in for much abuse in the more extreme French press, and French officials everywhere have viewed its activities with disfavor, if a stronger word is not appropriate to their feelings.

It is difficult to state just how deep and how sincere is the reported feeling among the Arabs and Syrians in favor of an American mandate in Syria. It is to be feared that they look upon us as the power which is most likely to improve their material and economic position without injuring their hopes of ultimate independence, and also as the power that is most likely to be accepted by the Peace Conference before France—probably the only power that could be given precedence over French claims to a Syrian mandate. The peoples of the Near East are especially skillful in making the representatives of any western nation feel that their special and particular love and devotion is given to them and to them only, although within half an hour of voicing such sentiments the identical assurances may be given to the representatives of some rival power. In other words, they seek first of all their own selfish interests, and too much credence should not be given to their protestations of friendship for America.

American interests in Syria are relatively important, and can become much more so as the country develops and expands under a better government. Americans in the country have, however, already been made to feel that if the French control they will be placed under a distinct disadvantage. The American University at Beirut fears that its privileges will be infringed upon, while the small amount of American import business in minerals, oils, cotton goods, etc., which has so far been undertaken since the armistice has had to meet special discriminations and obstacles placed in its way. It is to be feared that the French idea of a mandate is none too liberal, either toward the rights of the peoples covered by the mandate or the rights of other powers in the territory of the mandate.

French Press Comment on Syrian Question.

The French press of about the middle of September contained numerous articles in regard to the newly concluded accord concerning Syria. Pertinax in the *Echo de Paris* for 17 September reviews the provisions of the Sykes-Picot agreement, and remarks that the English may advance the plausible argument that the French are en-

titled to a mandate if there is to be any mandate, but that the Arabs are entitled to decide whether they want one. To which there is the answer that the matter was settled by article 22 of the pact of the Society of Nations, which, for the regions under consideration, recognizes the necessity of an International mandate. The French cause rests upon this basis and must prevail.

The *Libre Parole* of 16 September, after saying many unpleasant things about the English, Gen. Allenby, and Prince Feisal, concludes with an attack on the Crane-King commission, stating that most of its members, including its president, were Jews, and that the president was the director of the Vacuum Oil Co., in Palestine, attending to its business rather than the affairs of the commission (one of the assistants was in fact, formerly with the Standard Oil Co. at Jerusalem, but he occupied a minor capacity in the commission's activities). It is further stated that the commission asked fantastic questions having no real bearing on the question at issue, and that at Beirut, where it knew the sentiment to be overwhelmingly pro-French, it refused to receive the votes of the French corporations and institutions. Finally, the result of its investigation was that Syria did not want to be English or French, but American!

On 13 September this same paper stated that while the English are grateful to France for her help against Germany, they are not anxious to see her regain her former power. Hence their obstructionist policy in the Near East, where France has always been most brilliantly successful. There has been a great deal of trickery practiced, in addition to the secret treaty with the King of the Hejaz, such as the treatment of French troops, the maneuvers of the Emir Feisal, and the American Commission of Inquiry. The English have established themselves in Palestine, although it was to be internationalized. They want to take away from the French all the region of Mossoul with its oil, while the Americans covet Cilicia and its cotton (sic). The French would have the Lebanon and a coast without ports. That is the delightful little mandate which they would deign to allow the French between Americanized Turkey and Arabia in the pay of England. The agreements of 1916, poor as they are, should be made the basis of the new settlement.

On 17 September this paper, under the title "une Duperie" said that the maneuvers of the English in Syria had a double object to diminish the zone accorded to France by the 1916 agreement, and by Arab intrigues to paralyze French action in the regions which they are obliged to allow her. They have been successful. Now they are trying to confront the French with the accomplished fact. The French Government must not fall into this snare.

The *Figaro* of 17 September adopted a more conciliatory tone, stating that the French interests can not be relinquished, but they

can be conciliated with British interests by the exercise of a little good will on both sides.

The *Journal* (16 September) feels that the arrangement suggested by England is the worst one possible. The nature of the agreement between the English and Feisal is not known, but in order to occupy Syria and French must hold Damascus and the interior. Difficulties are said to await the French, and doubtless they have been carefully prepared for months past, but the French Government has men like Lyautey who are capable to dealing with Islam and such men must be used.

The *Gaulois* of 13 September feels that it is high time that the question of Syria is settled. The French are bound only by the treaty of 1916. The Syrian question should be settled on its merits and not coupled with the fate of the Turkish Empire. There can be no conciliation until the English evacuate Syria.

The *Echo de Paris* states that past mistakes must be avoided in Syria, for if the Syrian problem evolves in the same way as the Egyptian the value of the Franco-British Entente will be seriously lessened. A provisional arrangement is needed now, as the question can not be finally settled until the future of Turkey is determined. British troops which occupy the sphere of influence allocated to France in 1916 should be recalled. In these zones Emir Feisal should be made dependent upon France for loans, etc. This would put France on an equality with England in regard to the Arabs.

The *Figaro* of 14 September, declares that the British Government has still to transform into deeds the professions of friendship appearing in the British press. There is no need to remind the French of the rights of the Arabs, since French rule in Tunis, Algiers and Morocco proves this. The English are going to exercise a protectorate over Mesopotamia, Arabia, and perhaps Palestine; they have just acquired a semiprotectorate over Persia. The French are far from casting doubts on their ability to administer those regions, and they should surely trust the French just as far in Syria.

A long article in the *Journal des Debats* for 15 September, states that it is necessary to see things in Syria in their true light. The Anglo-Arab negotiations were kept secret from France until a few months ago. By the agreement of 1916, France was to have the exclusive right of supplying counselors and financial help to any Arab-States that might be created in the interior of Syria. The régime of military occupation tended to render possible the execution of this clause. Although it may not have been the policy of the British Government, pan-Arab feeling against France has certainly been aroused by a small group. England can still prevent some of the worst consequences to France by returning the spirit of the 1916 agreement

and giving to France the influence in Syria which England has in Mesopotamia.

Gustav Herve in the *Victoire* of 18 September concludes a review of the diplomatic side of the question with the statement that according to the diplomatic papers produced, England has acted loyally in the Syrian question since 1916. Before exclaiming against the long teeth of the English, the French would do well to reflect on their new colonial possessions in Africa and Asia, by which they enlarge a colonial empire which is, alas, already out of all proportion to the wretched French birth rate.

The *Humanite* of 17 September, is the only paper to publish the communique of the Foreign Office in this matter, as follows:

> The relief of the British troops is evidently to be fixed for a date in the near future. The French Government must not fail to realize that a fairly large corps of occupation will be needed, at least during the present period of agitation in public opinion.

This is then to be the price of the mandate: "A fairly large corps of occupation." The paper protests against the policy of the persons "whose eyes are larger than their stomachs." If this is to be the price of the mandate, it should be repulsed.

THE GERMAN CONSTITUTION.

Source: Reliable.

11 October 1919.

The German Constitution was adopted by the National Assembly on 31 July 1919, and became effective on 13 August. This constitution is based on the plan for a national constitution which has already been summarized in these pages. There are, however, certain changes which make advisable the summary of the constitution as it has actually been adopted. This constitution is more socialistic than that of any other nation, but the nonsocialistic parties evidently had great influence in making the socialistic provisions not mandatory but permissible.

The preamble to the constitution declares that "the German people, unified in all its branches and with a determination to build up and strengthen its domain in liberty and justice, to preserve peace both at home and abroad, and to foster social progress, has adopted the following constitution":

Section One. Composition and Functions of Government.

The German national State is declared a Republic, its power derived from the people, its territory the territories of the various German States. The flag of the Republic is black, red, and gold, and the trade flag is black, white, and red, with the national colors on the upper left-hand corner. The power of the State shall be exercised

through the various agencies of the Government. The National Government has exclusive right over:

1. Foreign relations.
2. Colonial relations.
3. State property, emigration and immigration.
4. Military organization.
5. Coinage.
6. Customs.
7. Post, telegraph and telephone.

The Government has right of legislation, but not the exclusive right, over such matters as civil and criminal law, passports, poor laws, the press, organization of representation, weights and measures, issue of paper money, banks, traffic in food articles and luxuries, insurance, industrial pursuits, navigation, railways and waterways. It also has such rights over what is called the population policy—that is, provisions affecting children—and over national health, the protection of plants, the socialization of national treasures and economic undertakings, as well as production, distribution, etc. (It is clear that many of the points were dictated by the Socialists, but that the Democratic and other parties, had eliminated them from the exclusive right of legislation vested in the National Government.)

The Government possesses legislative power, but not the sole legislative power, over taxes and other sources of income. The rights of the Government in this respect naturally transcends those of the States, and the highest national court must make the decision in case of a direct conflict of opinion. The States have a certain independence in that laws are still exercised by State officials under the direction, however, of the central Government.

The Government is also permitted, if centralized control seems necessary, to legislate concerning community welfare, public security, the rights and duties of religious associations, schools, and scientific publications, land rights, settlements, titles, and interments. The Government has general supervision of taxes in order to prevent duplicate taxation, injury to income or trade, excessive taxes on the use of public ways of communication, and in order to exclude or conserve important communal interests.

Every separate State must have a republican constitution, and the peoples' representatives must be chosen through a direct and secret vote cast by all men and women citizens on the basis of proportionate representation. The division into States is intended to serve the highest economic and cultural interest of the people, and changes in State boundaries must be decided by referendum. In case of constitutional disputes within a State or disputes between States, the national supreme court must decide the issue.

Section 2. The Reichstag.

The Reichstag consists of representatives of the German people chosen on the basis of universal, equal, direct, and secret vote by all men and women over the age of 20 in accordance with the principle of proportionate representation. The Reichstag is elected for four years and must convene on the thirtieth day after its election. The President of the Republic may dissolve this body, but a new election must be held immediately. The Reichstag chooses its own president and secretary and determines its own order of business; between two adjournments the president and his representatives conduct necessary business. The president has also general supervision of the expenses authorized by the Reichstag. All the proceedings are to be open, although the public may be excluded on a two-thirds majority vote. In general a majority vote is sufficient. A court of election control is to be formed in the Reichstag. The Reichstag may command the presence of the chancellor or any other Government ministers, who shall always have access to the meetings of the chamber.

The representatives of the State governments, furthermore, must always be heard if they make a request to speak. The Reichstag can appoint committees of investigation and shall be active continually and not only during the sessions. Members of the Reichstag have parliamentary immunity from arrest. Any officials or members of the army must automatically be given leave of absence if they seek election to the Reichstag. All members of the Reichstag are to be paid as prescribed by law and to have free transportation over all German railway lines.

Section 3. The National President and the Government.

The president must be chosen by the German people. Any German 35 years old is qualified for the office. He shall remain in office for seven years unless deposed by referendum at the request of the Reichstag. He shall represent the nation in matters of international law and shall conclude alliances and treaties, accredit and receive ambassadors, etc. He may appoint and dismiss Government officials and military officials, and he has command over the military forces of the nation. This command even permits him to compel any State to fulfill its obligations by the aid of armed forces. The president exercises the right of pardon. All dispositions which he makes must be countersigned by the prime minister. If he is incapacitated he is to be represented by the chancellor.

The administration consists of the chancellor and the Government ministers. The chancellor, and, at his suggestion, the ministers, are appointed and dismissed by the president of the Republic. (Nothing in the constitution provides definitely that the cabinet must rep-

resent the dominant party in the Reichstag, but it is probable that the administration would indicate, as in England, its responsiveness to public opinion in this way.) The chancellor shall determine the line of policy and present it to the Reichstag. The Government administration must ratify its decision on the basis of a majority vote.

Section 4. The National Council.

The National Council, called in the first draft of the constitution the Staatenhaus, now called the Reichsrath, is formed for representation of the German States in the national administration. In this council each State shall have at least one vote, and of the larger States one vote will be accorded to every million inhabitants. No State may have more than two-fifths of the vote, and in committees no State has more than one vote. The administration must summon the Reichsrath on the demand of one-third of its members. The president of the Reichsrath must be a member of the administration which, in turn, may take place in the dealings of the Reichsrath. (The power of this body has been distinctly lessened to prevent its ever becoming an autocratic body. It does, however, have the power of veto on measures passed by the Reichstag.)

Section 5. National Legislation.

Programs of legislation are to be introduced by the Government or by the Reichsrath. When the Government introduces legislation it must be with the assent of the Reichsrath. The president is directed to make a compilation of all laws for publication within one month in the government legislative records. All laws come into force on the fourteenth day following the date of publication. There are various rules included as to deferring publication for one reason or another and also for referring laws to the people for referendum if the president so desires. The Reichsrath may veto laws passed by the Reichstag, but the Reichstag may pass over such veto by a two-thirds majority vote. The Reichstag decision, furthermore, may be nullified by referendum only when the majority of the qualified voters participate in the vote.

Section 6. National Administration.

Relations with foreign states, defense, colonial administration are purely national affairs. The German merchant ships and the customs boundaries are also considered national rather than state affairs.

The Government, for the sake of uniformity, must provide by law for the organization of the administration of taxes in the different States and annually must balance accounts with the Confederated States. There must be a budget in which all revenues and disbursements are computed for every fiscal year, but in drawing up this budget the Reichstag may not increase old expenses nor add new

expenses without the consent of the Reichsrath. The minister of finance is to submit an account of reckoning to the Reichsrath every year.

The postal, telegraph, and telephone service, as well as postage, are purely national matters, and article 89 also states: "It is the nation's duty to take over railroads serving general traffic with all their property and to manage them as a unified system of communication." Much the same phraseology is used in the matter of waterways, and the method of government ownership and control is definitely laid down. There is a distinction made between such roads as serve general traffic and small private roads, but all roads are under government supervision. (It will be noted that although it was obviously the intention to take over the administration of all land and water traffic, this is not made mandatory in the constitution.)

Section 7. Administration of Justice.

Very little is said about the courts of justice, except that the judges shall be independent and subject only to law, and that legal justice shall be administered through the national and state courts. It is made clear that extraordinary courts are illegal and that no one shall be removed from the jurisdiction of his legal judge. The judges are appointed for life. According to a law to be enacted, a national supreme court is established for the German nation

Section 8. Fundamental Rights and Duties of Citizens.

All Germans are equal before the law, men and women having the same civil rights and duties. All public advantages and disadvantages of birth are suspended and titles of nobility may be used only as part of a name. A title may be conferred only when it is used to designate an official or a profession. The State can not confer orders or insignia, and no German is permitted to accept a title from a foreign government. In the different States every German has the same rights and duties as a citizen. All Germans enjoy the right of free travel throughout the nation, and have the right to sojourn or to settle, to acquire real estate, and to earn a living, anywhere in the country. Furthermore, any German has the right to emigrate to a foreign country and will have the right of protection of his Government wherever he goes. No German may be delivered to a foreign Government for prosecution or punishment. Personal freedom can not be impaired except as prescribed by law.

A code may not be violated. Secrecy of letters and messages transmitted by telegraph or telephone can not be impaired. Every German has the right within the limits of general law to express his opinion by word, in writing, by a picture, or in any other way, and nothing must hinder him in the exercise of this right. No censorship exists although measures may be passed for combatting indecent literature and for the protection of youth.

Section 9. The Social Life.

Marriage as the foundation of family life and the maintenance and increasing of the nation is under the protection of the constitution. This particular protection is also extended to young people in the way of moral, mental, and physical guarantees. All Germans are permitted to gather in meetings of any kind not contray to law. All citizens are eligible for Government appointments, which in normal cases are for life. These officials are servants of the whole community and not of any party. All citizens are obliged to perform personal service for the State and the community; the emphasis on individual obligation is very strong.

Section 10. Religion and Religious Societies.

This section guarantees absolute freedom of religion. It recognizes no State church and gives religious societies recognized as public corporations the right to raise taxes according to the provisions of the different State laws. The most interesting statement in this section is that " Societies which have as their aim the cultivation of a world conception of life are put on an equal footing with religious societies."

Section 11. Education.

All schools of science and art are free. The entire school system is put under the general supervision of the State, which makes it tendance at school compulsory. Private schools are not absolutely prohibited, but must exist under the supervision of the State, and will not be permitted if they make any " division of pupils according to the amount of property possessed by their parents." Moral education, strong civic sentiment, and professional ability in the spirit of German and of international reconciliation are to be particularly insisted on in all schools. Imparting of religious instruction is left to the desire of the teachers, but, in general, schools will be expected to include religious instruction in the curriculum.

Section 12. Economic Life.

The regulation of the economic life must be made with the object of assuring to all a life worth living. Freedom of contract is permitted. Confiscation can be carried out only for the benefit of the community and with appropriate compensation. The State will watch over the division and use of land in order to prevent its misuse and to insure to every German a healthful dwelling. The State is permitted through the law to carry through socialization by transfer to public ownership of any private enterprise adapted for socialization. Labor is stated to be under the special protection of the nation, but in addition every assistance is to be given to productive intellectual labor as well as to manual labor. There is to be estab-

lished a regular system of insurance. It is particularly pointed out that workers and officer employees are qualified to take part with equal rights and in cooperation with employers in the regulation of wage and labor conditions as well as in the entire economic development of productive forces. Here the workers' councils are to be welded into a national workers' council, which will be called the National Economic Council. This council has a right to propose plans of law to the Reichstag and to send its representatives to speak in the Reichstag. The general development of this plan is left for further regulation.

Section 13. Transitory and Final Regulations.

This section takes up the various articles of the constitution, announcing the dates on which they shall go into effect, and explaining the gradual transference of authority from the present provisional government to the final constitutional government.

INFORMATION CONCERNING SCHLESWIG.

Source: Reliable.

12 September 1919.

The following are extracts from a memorandum prepared by one of the editors of a large Ribe newspaper in conjunction with the delegation of British journalists who recently visited Denmark.

In the treaty of peace with Germany it was decided that the population of Schleswig inhabiting the territory to the north of the line designated in article 109 should be called upon to pronounce by a vote that was to be taken under the following conditions:

(1) Within a period not exceeding 10 days from the coming into force of the present treaty the German troops and authorities (including Oberpräsidenten, Regierungspräsidenten, Landräthe, Amtsvorsteher, Oberbürgmeister) shall evacuate the zone lying to the north of the line above fixed.

The question of securing the liberty of the plebiscite has from the start been the chief consideration in all discussions and decisions concerning the Schleswig question.

To one familiar with the rule of the Prussian authorities, it is evident that it is absolutely necessary that those authorities be prohibited from exercising any influence on the plebiscite. In former times the Prussians practiced intimidation, not only upon all the officials and functionaries of the State and townships, but also upon all the minor officials. They have not hesitated from "stuffing the ballot boxes." German officialdom through its far-reaching organization has always worked through propaganda and through promise and decoys. This influence should be removed.

The first Aabenraa resolution, which was adopted by the Northschleswig voters' association on 17 November last year and by the Danish minister in Paris turned over to the Peace Conference, demands in paragraph 3 that "the present authorities must not be allowed to influence the plebiscite." The question of Middleschleswig—especially as regards the city of Flensburg—is the nucleus of the whole frontier problem, and as the German authorities here conducted affairs according to Prussian ideas, the securing of the free exercise of the plebiscite in Flensburg and Middleschleswig gradually attracted the attention of all and occasioned the second Aabenraa resolution of 30 December, 1918, which, after a sharp protest against the behavior of the German authorities making the plebiscite illusory, pronounced, "We urge upon the Danish Government when watching our interests at the Peace Conference to call attention to the fact that the Danish population in Middleschleswig under such conditions can not hope to obtain its national rights by means of a plebiscite."

The decision of the Northschleswig voters' association has been decisively important in the development of the Schleswig question as it became the basis of the settlement made by the Peace Conference. When the Danish and Schleswig delegation at the end of February went to Paris one of its most important objects was to take steps to insure the freedom, fairness, and secrecy of the vote.

The Belgian committee, which had debated the Schleswig question, at first considered that effective measures had been taken to safeguard the plebiscite. During the committee's negotiations with the delegation on the 6th of March the chairman of the committee asked "If evacuation only was desired within the district of the plebiscite or beyond"; and the reply from the Danish side was "that to avoid friction" (i. e. collision with the German authorities that might threaten the quietness, order, and liberty in the district of plebiscite) it was desired that "an area of about 10 kilometers further south be evacuated." "Are there troops there also," the delegation was asked. "No," replied the spokesman of the delegation; "but steps should be taken to prevent troops from being there."

This argument shows clearly that from the first there has been a desire on the part of the Danes to have an area 10 kilometers deep evacuated south of the plebiscite district. The Danes desire a belt between the German authorities and the plebiscite district that German influence might be removed from the population at North and Middle Schleswig. It is emphasized above that German troops should be prohibited from coming in contact with the southern part of the plebiscite. However, this is probably what will happen. The German troops are to be stationed at the southern frontier. At a

village like Munkbrarup in Angel through which the zone frontier runs, German soldiery is stationed quite close to the district of the plebiscite, thus giving the impression that German militarism is not crushed. The evacuation south of the district of the plebiscite would serve not only the security of the plebiscite, but it would also agree with the interests of the victorious allied and associated powers, as it would give the population tangible proof of the complete breakdown and annihilation of German militarism.

Before the Danish-Schleswig delegation left Paris, it was informed by the Belgian committee that the idea of the committee was to have evacuation by the Germans as far as the line Sli-Eider. This information was received with pleasure by the members of the delegation, especially those looking after the interests of the Danish Middle Schleswig. Paragraph 109 runs thus: "The German troops and authorities (including the Oberprasidenten, Regierungsprasidenten, Landräthe, Amtsvorsteher, Oberbürgermeister) shall evacuate the zone lying to the north of the line above fixed." The Regierungspraesident with the whole Government staff resides in the town of Schleswig. Its removal has been ordered and the international commission has been given the authority of making the arrangements necessary to break the influence of the German bureaucracy on the plebiscite.

PERSIA—THE POLITICAL SITUATION.

Source: Reliable.

22 September 1919.

(12188.)

Present Situation.

For the past decade Persia has been dominated and exploited by her two powerful neighbors, Russia and Turkey, large areas of territory being taken from time to time by various treaties forced upon her.

The general acceptance of Persia as a nation, on the part of the larger powers, has created in the Persian Nationalistic Party a renewal of hope of Persian sovereignty and territorial integrity.

To this end a Persian delegation attended the Peace Conference, headed by Monshauer El Memalek, minister of foreign affairs. Among the more important demands prepared for presentation were the following:

(*a*) That the Anglo-Russian accord of 1907 and the Russian ultimatum of 1911 be declared null and void.
(*b*) That foreign powers abstain from intervening in the internal affairs of Persia.
(*c*) That the armed forces of foreign powers and their consular guards be withdrawn from Persian territory.
(*d*) That the treaties made between Persia and foreign countries be subjected to a revision, to the end that all clauses contravening the political, judicial, and economic independence of Persia be eliminated.

However, the Persian State is in a position of great strategic importance to Great Britain, situated, as it is, on the road to India, and largely dominating the Persian Gulf and adjacent waters.

At the sessions of the Peace Conference the British delegation succeeded in excluding the Persian delegation, on the technicality that Persia was not a belligerent. Subsequent to the failure of the Persian delegates to obtain a hearing at Paris, Great Britain entered into direct negotiations with Persia, the conference sitting at Teheran, whereby Great Britain will provide Persia with expert assistance and advice for the rebuilding of the Persian State.

The following are reported as being included in the new agreement:

(*a*) Great Britain to absolutely respect the territorial integrity and independence of Persia.
(*b*) Persia is to establish a uniformed force which will be put under the instruction of British officers.
(*c*) Great Britain will advance £2,000,000 for the carrying out of certain immediate reforms, under the direction of a British financial adviser.
(*d*) Persian customs receipts are to be given as a guaranty for this loan.
(*e*) Britain is also to back Persia in realizing the settlement of certain unsettled claims.

Among the Persians the status and prestige of America is far greater than that of any other country.

During the past two years several attempts have been made to introduce Bolshevism into Persia. At various times Bolshevist leaders have appeared in Turkestan, Mongolia, and Northern Persia, but small foothold has resulted from their efforts. They contemplate a Persian Socialist newspaper.

Future Situation.

The problem of the immediate future seems to be a satisfaction of the Persian craving for political, economic, and judicial independence, and the protection of Great Britain's vital interests from such perils as have threatened her empire during the past war.

The departure of the Sultan on his European and American trip is believed to have been due to pressure from the opponents of the recent British treaty.

CONDITIONS IN ENGLAND.

Source: Reliable.

13 September 1919.

The British cabinet is continuing its consideration of the menace in Armenia arising from the attitude of the Turks and Kurds, who are alleged to be awaiting opportunity to act after the approaching withdrawal of outside assistance. Of interest in this connection is the recent decision of the Government to order a *de jure* but not a *de facto* withdrawal of the British troops in that territory. Lloyd-

George in his speech on 18 August declared that it was difficult to reduce the British Army to a prewar basis until peace should have been signed everywhere. He said furthermore: "The peace with Turkey has not been signed, not because of any delay on our part, but because we are waiting for the decision of America. We want to know whether America is prepared to take her share in guaranteeing protection for peoples who, if they are not protected, will be subject to torture, misgovernment, and massacre. We have not yet had our answer, and until the answer comes we can not formulate our peace with Turkey. As soon as it comes, we shall have to adjust the settlement to the answer which America gives. Meanwhile, who is to protect these countries?

A statement attributed to an official of the ministry of shipping implies that Great Britain intends to insist upon securing 2,250,000 tons of the 3,000,000 tons of German shipping to be divided among the Allies by the reparation committee after the ratification of peace. He said moreover, that the situation was delicate and complicated, and that intricate international negotiations were yet to be completed.

The Government is still pursuing vigorously its campaign for economy; it has announced the abandonment of work on airships to the extent of between $125,000,000 and $250,000,000. The material thus released is to be devoted to the development of commercial flying.

ITALIAN NOTES.

Source: Reliable.

14 October 1919.

The consul at Trieste reports under date of 3 October that on the previous day two trucks with supplies for the regular army at Abbazia had joined the forces of D'Annunzio. Some 75 trucks carrying soldiers and military police had left or were about to leave for Abbazia, as in military circles there was a belief that D'Annunzio was planning a new move, and those men were being sent to check him.

Elections will not be held in Venezia Guilia, as the district is not yet annexed to Italy.

It is reported that the question of Fiume will be the most prominent issue in the electoral campaign. If collisions with the Jugo-Slavs occur the Fiume agitation may blaze up, but if nothing of that nature happens the present agitation is likely to diminish in force. The dissolution of the chamber has temporarily cleared the political situation.

Comments of French Press.

The first comments of the Paris papers for 16 and 17 September on the Fiume adventure were distinctly condemnatory, although in some instances sympathy with Italy's claims was expressed, and the occasion was taken to blame the stand of President Wilson in this matter.

The *Homme Libre* stated that the taking of Fiume by D'Annunzio is merely ridiculous and may have unfortunate results. Mr. Nitti's government is to be congratulated on its attitude. If Italian imperialism is not killed by the absurdity of this adventure, Italy must do all in her power to guarantee the execution of the compromise, which her great Allies are only too anxious to conclude with all due regard to her interests and aspirations.

The *Journal des Debats* (Gauvain) says that in trying to emulate Garibaldi, D'Annunzio is confusing epochs and countries. There are vast differences between Sicily and Croatia, 1860 and 1919. He can not be successful, not because of the opposition of the conference, but because of the will of the inhabitants of Fiume, of which a majority are hostile to annexation by Italy. The annexationist campaign of the spring has ended in a threat of civil war, which makes it all the more regrettable that the Peace Conference did not at once ensure the execution of the recommendations of the four Allied generals in their report of 9 August.

The *Gaulois* says that D'Annunzio's action might have been comprehensible immediately after Mr. Wilson's message, but that now the negotiations are nearly completed. The resulting solution will be accepted by the Government at Rome because in addition to the Adriatic problem there are provisioning and financial problems which can not be solved without the help of the Allies and especially of America.

Political.

There does not seem to be any very great amount of popular enthusiasm here over D'Annunzio's action. The subscription which has been started in aid of the provisory government of Fiume by the *Corriere Mercantile* has amounted in two days to only 31,000 lire—and Genoa is one of the richest cities in Italy—whereas in Milan in two days 300,000 lire are said to have been subscribed for the same purpose. The subscription started by the *Secole XIX* has brought in only about 12,000 lire.

The violent attacks against Nitti in the *Corriere Mercantile* continue. Yesterday it published in large type:

"Nitti and Wilson alone do not wish Fiume Italian."

"Gabrielo d'Annunzio can not treat with Nitti."

" The interests of Italy are not those of Nitti, and vice versa. Nitti must go, and let him do it quickly."

The *Lavoro* continues to uphold the Government and the *Secole XIX* is still noncommittal.

Economic, Commercial, Financial.

The strike of the metallurgical workers continues, as does also that of the coal heavers in the port.

It was stated recently that owing to this last strike, which has lasted since 1 September, 18 steamers with 70,000 tons of coal were held up in the port here, and further reductions of both passenger and freight trains have been made by the State railways. The representatives of the syndicate of the coal heavers have been called to Rome to confer with the Government.

The American steamship *Sewalls Point* arrived in this port on 17 September with a cargo of coal, and after having attempted in vain to discharge the coal here has now left for Naples.

There is as yet no improvement observable as regards business.

The rate of exchange continues very high, the dollar having been quoted here at 10.05.

Shipping.

American vessels arrived in Genoa since September 16:

Steamship *Sewalls Point* from New York	Sept. 17
Steamship *Callooh* from Portland, Me	Sept. 18
Barkentine *Cecil P. Stewart* from Rockland, Me	Sept. 18

American vessels in port:

Steamship *Westoil* (at Spezia for repairs)	Oct. 13
Auxiliary barkentine *City of Beaumont* from Orange, Tex	Sept. 6
Steamship *Edenton* from Seattle	Sept. 8
Steamship *Sahale* from Philadelphia	Sept. 14
Steamship *Sewells Point* from New York	Sept. 17
Steamship *Callooh* from Portland, Me	Sept. 18
Barkentine *Cecil P. Stewart* from Rockland, Me	Sept. 18

American vessels sailed from Genoa:

Steamship *Franklin* for Hampton Roads	Sept. 17
Steamship *Bylayl* for New York	Sept. 17
Steamship *Deepwater* for Hampton Roads	Sept. 17
Steamship *Westmead* for Hampton Roads	Sept. 16
Steamship *Susana* for Hampton Roads	Sept. 18
Steamship *Bremerton* for Norfolk	Sept. 17
Steamship *Caloria* for New York	Sept. 16
Steamship *Coastwise* for Norfolk	Sept. 17
Steamship *Canoga* for Savannah	Sept. 20

American vessels arrived in Genoa:

Since Jan. 1, 1919	91
During corresponding period of 1918	88

Total number of vessels of all nationalities sailed from Genoa:

Since Jan. 1, 1919	325
During corresponding period of 1918	330

POLITICAL CONDITIONS IN BRAZIL.

Source: Reliable.

22 October 1919.

There has developed a state of unrest in Rio Grande do Sul in addition to the two States of Bahia and Pernambuco.

In Rio de Janeiro the conditions are still more aggravated, the following incidents having occurred:

(*a*) The police have suppressed the newspaper *Sparticus* for anarchistic writing.

(*b*) The police closed meetings of four different classes of workmen in their separate headquarters.

(*c*) The police discovered the makers of bombs and two houses in which these bombs were stored.

(*d*) A bomb was found on a street car and thrown out without damage.

(*e*) A riot took place in the main railroad station, the police arresting about 30 persons as instigators.

(*f*) There was an attempted assassination of the head traffic manager of the street railway system. He is an American; the company is Canadian, but principally run by Americans.

It is stated that the police are going to round up about 70 of the ringleaders within 48 hours and send them to the penal colony on the Island of Marañhoa.

There are besides Brazilians many Spanish, Italian, and Argentines in the list of suspects.

It is thought that a probable source of the money supplied and the instigation comes from Argentina. A popular war between Argentina and Brazil would help stabilize the former Government.

Conditions in Brazilian Navy.

At the present time all the guns on the Brazilian battleship *Minas Geraes* are disabled and parts of the main engines have been sent ashore as a precaution against the threatened trouble of the crews of the *Minas Geraes* and destroyers.

It has been stated by one of the officers on the *Minas Geraes* that this trouble started in the Brazilian Navy before leaving for Ilha Grande, and that no doubt the reason for leaving without making preparations for target practice was on account of the trouble they were having with some of the enlisted men on the destroyers, who were being reported by the police authorities on shore as being in constant attendance at the Bolshevik anarchistic meetings.

On account of the work at Ilha Grande which required twenty-two days, the trouble in the navy seemed to have quieted down to a great

extent. However, the day before leaving Ilha Grande one of the officers on the *Minas Geraes* discovered a signal that had been sent from one of the destroyers privately to one of the supposed leaders of the Bolshevik movement on the *Minas Geraes*. The signalman who received the message had inadvertently failed to destroy the copy. In this signal it was learned that the navy was invited to join the Bolsheviks on shore in a general strike on the day of the arrival of the fleet. This was further confirmed by another officer discovering in the pocket of a raincoat which had been worn by one of the crew a letter from one of the leaders of the shore movement to one of the men on the ship inviting them to join in the general movement on the date specified.

On the day of the arrival of the fleet in Rio de Janeiro all officers and men were kept on board ship until the admiral in charge had made a visit to the minister of marine, and in which conference it was decided that liberty would be granted to the officers that evening. However, other complications arose which necessitated the recall of all the officers on board at 1 o'clock a. m. On the following day 25 of the so-called leaders on board the *Minas Geraes* were sent ashore and imprisoned. To date 33 men of the *Minas Geraes* are in prison awaiting trial by court-martial, being suspected of joining in this movement.

There does not seem to be as much excitement amongst the officers on board the *Minas Geraes* about this matter as there is on shore. While at Ilha Grande several of the officers suspected some of their men as being Bolshevists and trouble makers, but they did not seem to regard it as a general affair in the navy. They gave as a reason for their action in this matter of arresting the 33 suspected leaders as being the proper thing to do, as, according to them, the last mutiny in the navy was started by 15 men on board the *Minas Geraes*. In the course of three days this movement extended to several hundred men in all the ships. The officers think that 5 per cent of the navy can stampede the other 95 per cent into mutinous actions.

Everything seems to be normal on board the *Minas Geraes* at the present time except that all the valves to the hydraulic mechanism of the turrets have been removed and the guns have been wedged so that they can not recoil. The 4.7 guns have been disabled by removing all the firing locks, and parts of the main engines have been taken ashore as previously mentioned.

CONDITIONS IN ODESSA.

Source: Reliable.

11 September 1919.

(11426.)

When the Bolsheviks evacuated Odessa, Whittemore entered the city on the first Russian relief ship. A report has been made by the Bolshevik commissioner of finance in Odessa, Dookhovny, that between the dates of 1 April and 1 July the printing press of the Soviet printed daily 10,800,000 rubles, this money being for use only in the Odessa area, namely, within the Kherson Government. Either on 1 July or on about that date, there was no longer any paper left on which money could be printed and it was found necessary to import money from Moscow. Inasmuch as transportation was poor on the railroads, the money from Moscow reached Odessa very irregularly and ultimately no one received any pay. The attacking forces captured on the railway and in vessels several Bolshevik commissioners of importance. Trains between Odessa and Kief were attacked by Cossack bands, and the Bolsheviks thus found it impossible to thoroughly evacuate the city. Immediate after the capture of the city Whittemore visited all the public offices, finding complete disorder, showing that at the last moments the Soviet authorities left the city in great haste. The British vessels by their bombardment of the city contributed to the confusion and helped to hinder the retreat, thus aiding the dragoons in the capture of numerous prisoners. Material in foreign languages between 30 and 40 in number was found in the international department. A considerable amount of propaganda material in the English language which included posters significant in their character was collected by Whittemore. All the Bolshevik commissioners who were captured were young, the oldest of them being not over 30 years of age and the youngest 18 years. The latter was the commissioner of lodgings, Mr. Pheffelite. Three and a half millions of rubles were found on Pheffelite, and on the commissioner of the port, Pavlov, two and a half millions were found. An estimate that has been made by Whittemore and is a most conservative estimate, declares that 75 per cent of the commissioners were Jews. In the towns in the region between Odessa and Kief severe pogroms of Jews are going on. Calenitchenko, a medical student from Georgia, 21 years old, was the chairman of the committee on executions. A negro who received 1,000 rubles and the clothes of the victims actually committed the murders. Many were killed by a Jewish girl, aged 20 years. Her method was to shoot them in the eyes. The places where the murders were carried out were visited by Whittemore and he found the walls and doors spattered and clotted with blood

and riddled with bullets, and the odor from those places was like that coming from a slaughterhouse. During the terror large numbers must have been killed. Whittemore says certainly hundreds. There is no fuel in Odessa and no method of lighting the city. Wood still brings a very high price. Bread has dropped from 150 to 15 rubles a pound. There being no facility for boiling water, disease causes 250 deaths daily. Twenty rubles is the price for one glass of boiled milk and 75 rubles the price of three eggs. In the volunteer army the moderate or Denikin group has control. With the exception of this statement nothing is positively known as yet concerning the new government which has been established in Odessa. The majority of the population of the city welcomed Denikin.

CONDITIONS IN RUSSIA.

Source: Reliable.

23 September 1919.

It is reported that *Prof. Nollmann*, who has been residing here, will be sent as German official representative to Moscow, while the Russian Soviet Government will send *Vorowsky* to Berlin.

Radek, the Bolshevik agitator, is still interned in Berlin. The German Government is discussing with the Soviet government regarding his extradition, and have given the following terms:

Radek must leave Germany and promise never to support Bolshevik propaganda in Germany.

The German hostages, which the Soviet government has taken are immediately to be put free. A wireless telegram was sent to Lenine from Budapest and this telegraphic answer was picked up and contained the following main points:

(*a*) There has been discovered a counterrevolutionary plot in Petrograd. The plan was to deliver Petrograd to Mannerheim's and Rodzianiko's troops. On account of this there has been introduced sharp terror in Petrograd.

(*b*) The Soviet government was ready to conclude peace with all nations, but this fact was not given out to the public. If France, America, Italy, and Japan will conclude peace with the Soviet government, then the Soviet government will be ready to acknowledge Russia's debt to these powers.

It is rumored that Kerensky lives in Berlin under a false name. If he should come into power again, it is expected that he will allow Russia to conclude peace.

It is, however, considered unlikely that Kerensky will get any large influence in Russian politics as his influence among the Socialists and the revolutionists is slight.

The former Russian war minister, Gutschkow, has left for Mitau to join the North Corps and Rodzianiko's government in Narva.

THE PLEBISCITE IN GRAND DUCHY OF LUXEMBURG.

Source: Reliable.

5 October 1919.

(11665.)

The plebiscite in the Grand Duchy of Luxemburg has been the subject of leading articles in the Belgium press this week. The result shows that over 60,000 voters favored economic union with France as compared with 22,000 in favor of Belgium. The decision taken by the people of Luxemburg has had the effect of creating an antagonistic attitude here toward France which shows itself not only in the articles appearing in the press, but Government officials themselves do not attempt to conceal their chagrin and disappointment. It is stated that the French Government has conducted an unfair propaganda in the Grand Duchy and it is recalled that for some months after the armistice the French military authorities refused to allow Belgian troops to enter Luxemburg, while they themselves maintained a large force in the Grand Duchy.

In a recent interview the Grand Duchess Charlotte, who is to be retained on the throne, states that she hoped it might be possible to form an economic union between the three countries, Belgium, France, and Luxemburg. Such an arrangement is not, however, considered probable of realization in Belgium. The Prince de Ligne, who was sent to Luxemburg as Belgian chargé d'affaires shortly after the armistice to further the claims of Belgium, has been recalled and will not be replaced.

The papers yesterday announced that at the request of the Belgian delegation, the next meeting of the commission charged with arranging the affairs between Holland and Belgium has been postponed to 9 October, in order to permit the Belgian delegates to formulate more concisely their claims.

It is said that the commission will probably decide against any military defense for the Scheldt. As regards the defense of Limburg and the Meuse, it is understood here that a military unit between Belgium and Holland is to be suggested as a solution. The Dutch chargé d'affaires, however, informs me that Van Swinderen, the chief Dutch delegate at Paris, will reply to this last suggestion that, owing to the high state of feeling now existing in Holland against Belgium, the Dutch Government can not consent to any such arrangement. This information is also corroborated by the foreign office. It, therefore, seems probable that after 9 October the negotiations at Paris will be broken off, in which case the foreign office feels that England and France may possibly bring pressure to bear upon Holland to agree to an arrangement for the military defense of Belgium. It is said that the Belgian Government will insist that the military and

commercial phases of the Dutch question be decided as a whole and will not consent to their separations.

Although a native of Walloon, Roonharmignie, the minister of science and art, has been compelled to resign owing to his relations with the Flemish Activists.

The class of 1918 of the Belgian Army having just been demobilized, the army is now once more on a peace basis.

HUNGARIAN NOTES.

Source: Reliable.

11 October 1919.

Political and Social.

There appears to have been in Budapest recently an outbreak of Monarchist feeling. On 5 October the city was placarded in favor of a monarchy.

There are some 400,000 people out of work in Budapest. The only money in circulation is Communist paper money, which is practically worthless. The depreciation of currency and the enormous increase in the cost of production has resulted in the refusal of the peasants to exchange food for any amount of money or to barter it for goods. Combined with the fact that practically all the cars have been removed by the Roumanians, this attitude of the farmers makes the outlook for Budapest very dark.

The Roumanian situation is unchanged except for some withdrawal west of Budapest. The Roumanians have not yet permitted the formation of a Hungarian police force and they continue their depredations.

Military.

It has been reported, but not confirmed, that 1,800 British troops have arrived in Budapest to take over the police service after the departure of the Roumanians, and that 2,000 Italian soldiers are expected to assist in this work.

AUSTRIAN NOTES.

Source: Reliable.

11 October 1919.

Political and Social.

It is said that the Austrian cabinet will resign after the ratification of the Peace Treaty, and that a new cabinet will be formed with Dr. Benner as premier. The time of the formation of this new cabinet is indefinite, but as the National Assembly meets on 13 October to take up the question of the Peace Treaty, and as there will

probably be little delay, the plan should be put into effect before the end of the month.

A subcommission will be established in Vienna to study the question of the revictualing of the country, and another committee will be appointed by the reparation commission to take charge of the redistribution of rolling stock. Such action appears to be imperative, since national bankruptcy seems imminent.

The anti-Semitic and more or less promonarchical parade in Vienna on 5 October was expected to cause serious trouble, as it was to be followed by a Socialist parade. The Government appeared somewhat perturbed and foreign commissioners were inclined to take a gloomy view of the situation. The affair seems to have been well handled, however, as the two parades were kept well away from each other.

At some time a full account of Italian demands on Austria for works of art, including the catalogue of those which were taken away forcibly because they were said to belong to Italy, will make an interesting minor chapter of history. The Italian minister in Vienna has added another paragraph to this chapter by protesting to the Austrian Government against the sale of the imperial art collection as being contrary to the terms of the Peace Treaty.

CONDITIONS IN AUSTRALIA.

Source: Reliable.

6 September 1919.

There continue to be many evidences of hostility felt by certain elements in Australia toward American commercial interests. The chief point of attack is the Webb Act, which is represented as a move on the part of American capitalists to secure economic domination over weaker countries, such as Australia. For example, the president of the Sydney Chamber of Manufacturers recently denounced the act as "an insidious and menacing plan" for the exploitation of Australia. The Newcastle City Council on 30 June adopted a resolution in which it was asserted that the purpose of the Webb Act was "to exploit Australia and other parts, and to use them as dumping grounds for all the surplus iron and steel products of the United States"; effective measures were demanded "to combat America's move." In some parts of the country it is believed that the recent decline in sterling exchange was caused by some action on the part of the American Government or American financial interests, the purpose of which was to add additional profits to sales of American goods in foreign countries. The feeling against this country is also due in part to the belief that the position of Great

Britain as the leading financial and trading country of the world has been imperiled by the recent development of American trade.

The volume of Australian foreign trade for the year ending 30 June, 1919, amounted to slightly over $1,000,000,000. This was the largest for any year since the establishment of the Commonwealth, the nearest approach to this record being in 1916–17, when the total trade amounted almost to $850,000,000. During the past year the balance of trade in favor of Australia amounted to over $67,000,000.

CONDITIONS IN POLAND.

Source: Reliable.

14 October 1919.

The Polish Dietre convened on 1 October. As already reported, it ratified the treaty with Germany on 31 July.

A general strike of Bolshevist tendencies was threatened at Warsaw for 1 October, but it did not materialize. The Government had announced that disorders would be severely dealt with and had made extensive military preparations.

The Polish socialistic papers have published a letter from the Chicago office of the National Socialist Party to leaders in Poland in regard to the alleged persecution of socialist, labor, and working class representatives in the United States during the war. It is stated that nowhere did the governing classes make such violent attacks upon the representatives of the laboring classes as in the United States at the beginning of the war. Special reference is made to the sentences imposed upon Debs, Berger, Mrs. O'Hare, Tucker, Enghall, Kruse, etc. The communication is signed by Adolf Azermer, national secretary, and concludes with the appeal that the Polish leaders will personally write to President Wilson demanding the liberation of the many political prisoners in America.

The Polish press devotes much attention to the controversies with the Czechs. The *Gazeta Polska* for 11 September described what the Slovakians have to suffer under Czech rule and declare that it is a crime that ought to appeal to the conscience of Europe. The Slovak nation turns to Poland to rescue them from their masters, and a delegation recently visited Warsaw to seek the support of Poland.

Details are also given of the protests of the population of various districts against being annexed to Czecho-Slovakia.

MISCELLANEOUS.

EXTRACTS FROM REPORT OF U. S. MILITARY ATTACHÉS AT THE HAGUE.

Source: Reliable.

12 September 1919.

(12022–A.)

Passport Control (Time of War).

When we look back on the history of passport control in the present war, the outstanding feature is the loss of time resulting from unpreparedness in establishing any system of American control. The enemy had ample time to organize spy agencies in the United States before our passport control became effective. At best, the final system was a development regulated by the expediency of the State Department and gradually forced upon it by the military, who instantly appreciated the lessons and experiences of the Allies. Even this final system, though inadequate in the authority delegated through the War Department to its military attachés, was indefinite in its wording; it left matters to the personal cooperation of officers in the different departments, and did not standardize regulations in the different countries.

In time of war, passport control is a military measure absolutely essential to the proper conduct of the war. Being a military measure, its importance can not be appreciated nor its execution controlled by the State Department.

Passport control was not a success in the past war, for the single reason that proper authority and responsibility over passport control was not vested in the military attachés. To show the inefficiency of the final system, it may be said that a good enemy agent could evade the scrutiny of our Government's war-time passport control and get to the United States in spite of our system at its best. This criticism can only be made because the military attachés who had the necessary organization and incentive to exclude such undesirables did not have the proper power. The late system can better be criticized by stating what provision should be made for a control in a future war for proper security against the enemy. Whatever system is decided upon to be put into operation in time of war should be enacted in a law at the present time, so that it will go into effect automatically upon the Declaration of War. Unless this is the case, even a short

period of delay between the declaration of war and the establishment of a control will enable the enemy to send his chief agents with money and facilities to our country and the control will have failed of its purpose to the greatest extent.

A dual passport control should be established upon the outbreak of war with coequal rights to refuse visés for passports by the consulate and the military attaché's office. All passport applicants must pass through the military attaché. No person should be allowed entry into the United States unless his passport is stamped with a military attaché's stamp signifying that he has been properly passed, his status and the conditions of his entry into the United States.

It is believed that a system where officers of the Army work under the consulate is faulty in that it depends upon personal cooperation. It should be dual for the reason that the consulate, which carried on the system alone in time of peace, should be part of it in time of war so as to carry on properly when the dual system is abandoned.

The military attaché passport control should be in the same building or adjacent, with interior communication to the consulate if possible, for the best cooperation between the two controls. This combination also makes for the best cover for the Intelligence Service of the military attaché, which can be carried on through his passport control office. A great deal of information is obtained from the applications for visé. Agents can report to this office with less danger of discovery, as if they were on legitimate consular or passport business.

In order to further carry on the Intelligence Service under cover of consular agency, extra consuls and vice consuls should be appointed and located in such cities of the country as deemed necessary by the military attaché. Such appointees should be Army officers of the Military Intelligence Division properly instructed in their work. These consuls should be accredited by the State Department in the usual way but reporting to the military attaché and paid by the War Department.

The suggestion is also made that in case of a European war quicker and better cooperation between military attachés in the passport control would be obtained if a central clearing house be established because of delay in passing information, such as lists of refused visés and local suspects, through the central office in Washington. In case of a war other than European, the location of this clearing house would, of course, depend upon the war theater.

The danger of lost passports due to carelessness of owners is a great menace to security against enemy agents in time of war. To reduce this danger to a minimum, the suggestion is made that each passport have a paragraph printed on it laying down drastic measures that will be taken with persons losing their passports.

The question of the definition of an undesirable in time of war has come up. The only general definition, from a military point of view, that can be given is, "*a person whose entry into the United States will not help to win the war for us.*"

It is also suggested that some system be devised whereby United States Army officers, not traveling with units, be made to report to military attachés with identification pass and orders. This is to prevent enemy agents traveling in uniform. For proper passage the officer should have the military attaché stamp on his orders.

Control during the Interim.

During the interim between the signing of peace and the complete abolishment of war-time control, the passport work is influenced by two factors:

(1) The necessity for reestablishing business relations and the unimpeded travel which this entails.
(2) The exclusion from entry into the United States of undesirables, such as Bolsheviks and other disturbers of social order.

It is felt that passport control should be kept up as long as possible to exclude undesirables, but at the same time modified and finally done away with to comply with the demands of American business in establishing proper relations with Europe. The military attaché should continue his part of the control as long as the danger exists of a great number of undesirables on his suspect lists attempting to reach the United States.

European conditions of to-day will make for a great rush of political refugees and undesirables of every kind to the United States if the bars of control are let down. The peace and reconstruction work of our country can only be protected from the influence of agitators of radical political tendencies, etc., by the continuance of strict passport control for some time.

On the other hand, it is paramount that the military attaché in his passport control work should recognize the great importance of speeding up the travel of individuals bound on American business interests. American business men from the United States passing through the country should be given every facility for rapid movement. Their passports originating in the United States are sufficient guaranty. The same is true of foreign or native business men coming to the United States to continue or to establish commercial relations with firms here. The important question in their case is to definitely establish the genuineness of their errand, which should be done with the least possible delay. Delay in meritorious cases only works harm to the reputation of the control.

The continuing of an organization in the office of the military attaché for passport control during the interim is highly important.

The tendency is to relax on this control to a great extent, when as a matter of fact this period is an unusually dangerous time. During this interim the lessons of war are fresh in our minds, and such an organization as is deemed necessary for a future war should be carefully worked out.

This interim should also be used for the classification of suspects and for obtaining detailed information on individuals, and a list from all available sources, especially, while liaison still exists with the allied officials.

Suspects may be classified on some such plan as this:

(1) International agents—to be kept under surveillance.
(2) Dangerous radicals—of all nationalities—to be kept under surveillance.
(3) Enemy agents and subagents—to be kept under surveillance.
(4) Suspects—who, upon the conclusion of peace are no longer dangerous, but whose names should be retained.

Military attachés should be continually informed as to the policy to be adopted in reference to the class of people who are to excluded, the changes in this because of changed conditions, etc. For instance, what is the present policy in reference to those who have had business or friendly relations with the enemy during the war.

Control in Time of Peace.

This period should be distinguished from the interim period which follows the signing of peace, but during which there still exist certain disorders which naturally follow a war.

In time of peace other than the interim period, there should be no actual military control of passports.

The military attaché, although not exercising control, should be in close liaison with the consul on suspect lists.

The military attaché in the period of peace should keep up his suspect list files by using the following sources:

(*a*) M. I. D. lists; lists from the British, French, and the local military, police, and governmental authorities.
(*b*) Suspects from refused visé list obtained from the consul.

The military attaché should be in close touch with the steamship companies and obtain from them the sailing lists. From these he can make note of the names of passengers who make frequent trips to and from America.

A plan of organization for passport control should be maintained in the office of the military attaché. One clerk under the supervision of the military attaché would be sufficient to carry on the work of maintaining the suspect lists and keeping up to date the plan of organization in preparation for war. These suspect lists and other information would have a distinct commercial value in time of peace. Copies of the list should therefore be distributed to the

Departments of Labor, Commerce, Immigration, Justice, etc. This value alone, quite apart from its value in preparation for the period of the war would justify the expenditures entailed.

Consuls should be instructed during this period of peace to advise and consult with military attachés in all cases of military suspects.

A law should be enacted as soon as possible providing for the immediate military control, as hereinbefore outlined on the outbreak of the war. This law might also provide for a certain amount of military control in case of a state of war between other countries even though the United States might not at that time have entered the war. There is danger in leaving such a question to a mere departmental order to be issued when the crisis arises.

Coordination and Cooperation of Military Attachés.

Necessity for cooperation and coordination is beyond discussion. The difficulties are great, because of geographical dissemination. They must be overcome by the organization and vigilance of the home office and by the spirit of cooperation among the military attachés themselves.

It is suggested that a system be built up in time of peace so imbued with cooperation and coordination that it will work automatically in time of war.

It is suggested that the home office:

(*a*) Issue weekly digests of military attaché reports, to all military attachés.

(*b*) Issue instructions to certain military attachés to send copies of all their reports of a certain nature to certain other military attachés. This system, it is suggested, should be kept up and checked by graphics in the home office. The liaison should be altered frequently to conform to existing conditions.

(*c*) Issue general instructions that all reports, of whatever nature, show on their face to whom copies have been sent. In the case of appendixes to reports, such as maps, documents, etc., it should be insisted that great care should be taken to indicate to whom copies have been sent.

(*d*) Encourage and facilitate, so far as funds allow, the personal meeting between military attachés, particularly those of contiguous countries. It is suggested that a new military attaché be ordered to his post via certain other posts, so far as possible. The results of the present conference are of greatest value to all concerned. It has permitted European attachés to become acquainted, exchange views, and make constructive criticisms of the operation of our work. These advantages are just as pronounced in the mutual visits of adjacent attachés. In war time, with espionage, counterespionage, black lists, and passport control, mutual visits are of the greatest necessity; and in peace time the advantages of one organization over an adjacent one is soon brought out by a visit. It is well for one military attaché to come to know, not only his neighboring brother officers, but the various members of the neighboring United States

legations and consulates general. The acquaintanceships formed often settle informally questions which otherwise remain unsolved or are given unnecessary serious official consideration.

(*e*) Encourage personal and frequent correspondence between adjacent military attachés. In this connection, as well as for the guidance and checking of the work of military attachés, it is suggested that the British system of semiofficial letters from the home office be adopted. For example, home officer writes to Warsaw: "Dear X: Please see pars. — your —, and pars. —, Z's —, which Z says he has sent you. Perhaps you and Z can get together by letter on this and decide the question for us."

(*f*) Send copies of instructions for the obtaining of information, documents and maps, etc. to adjacent military attachés so as to avoid duplication of effort. For example, if Prague is told to get maps of the Teshen region, Warsaw and Berlin should be informed at the same time.

In war time and in contiguous enemy territory, a certain amount of duplication is unavoidable in the collection of maps, etc., and the only way to avoid this would be to restrict each military attaché to his own territorial limits. This might result in the loss of valuable data. It is better to run the chance of some duplication rather than the loss of any real information. In peace time information from contiguous territory should be sent direct to the military attaché assigned to it and a duplicate at the same time to M. I. D.

Methods of Collecting Information.

The conference feels that it can not do justice to the task involved, as the subject is so great and covers such a wide scope of the military attaché's most important activities.

It therefore recommends that a competent committee should be appointed at Washington to make a special study of this subject. Such a committee, with ample time and with the records of the experiences of all the military attachés, and also to some extent those of our allied and enemy organizations, should be able to write a comprehensive manual on the methods of collecting information, secret agents, their training, organization, and control.

It is suggested also, that the preparation of special parts of this subject could be assigned to such military attachés as have had the most experience in handling agents. Committee might ask for voluntary contributions from military attachés who have had an especially interesting and successful experience along certain lines of employment of agents during the war.

The distribution of such a manual, of course, should be left to the discretion of the committee itself, but it is felt, at the present writing, that such a book would be very dangerous. However, each military attaché should, at one time or another, have an opportunity while in Washington to make a careful study of this book.

It is important that each military attaché be thoroughly familiar with the methods of obtaining, training, and employing agents, and

that he has at all times an up-to-date working plan for the employment of such agents as a preparatory measure against the outbreak of war.

This essential working plan will necessarily contain, besides the general principles laid down in the manual just referred to, certain elements depending upon a study of local conditions of the country to which he is accredited.

Dissemination, Guidance, and Criticism of the Work of Military Attachés by the Home Office.

It is the universal experience of the officers of this conference that there has not been in the past an efficient system of dissemination, guidance, and criticism of the work of military attachés, and that such a system is absolutely essential from every point of view.

Propaganda.

The present war has shown that propaganda is an arm of attack and defense whose development during the past five years is quite comparable to that of aviation. Therefore, the conference believes that the consideration of its use and development is one of the necessary and legitimate functions of the General Staff. To be prepared to use the powerful influence of propaganda at the instant when its use will most benefit us, an organization should be perfected in time of peace for its rapid expansion when necessary, or in time of war. Even in time of peace this organization should be available for the defense of the interests of our country if attacked. By its use and through its development an opportunity is given to present or clear up misunderstanding, to destroy the effect of dangerous untruths, to allay misapprehensions, and to calm crises at the moment of their inception.

All of the above objects are entirely in accordance with the principles always laid down and persistently observed by our Government; they tend materially toward the continuance of peace and friendly relations and make for the prevention of war. Having an organization perfected in time of peace, it is instantly available to be put in operation and to disseminate broadcast in a foreign country the truthful ideals, desires, or intentions of our country.

It is evident that the American ambassador or minister as the representative of the President in a country, is directly responsible for the dissemination of correct information covering all questions of American policy in the country to which he is accredited. He necessarily must be the directing spirit of any organization for propaganda, so called. In this organization he must be assisted by the military and naval attachés of his mission.

Censorship.

As the situation in regard to censorship in every country is different in character or scope, it becomes necessary for each military attaché to make his estimate of the situation, as it exists in the country to which he is assigned, and then to make the necessary recommendations.

The censorship should be under this sole direction and control, assisted by the necessary technical expert assistance and the necessary suitable trained personnel.

Censorship to be efficient and worth while must be complete.

To prevent dissatisfaction, in so far as possible, censorship when exercised should be as prompt as possible. This requires a large technical personnel.

Selection of Officers for Detail as Military Attachés.

It is very evident that a military attaché, having to act largely on his own initiative, being called upon to report on all phases of military science, and being isolated from the rest of the Military Establishment, must be an officer selected for experience, versatility, and ability. We must get away from a haphazard system of detail of military attachés if we are to obtain efficiency.

An officer selected for detail as military attaché should be notified of that detail six months before reporting at his post, and should be required to spend a sufficient part of that six months in training in the Military Intelligence Division at Washington. The outgoing military attaché should be required to remain at his post at least two weeks after the arrival of his successor, for the purpose of putting him as closely in touch as possible with the local situation.

The training of newly detailed military attachés should include a tour of duty and instruction in the office of the officer in charge of military attachés in the Military Intelligence Division in Washington. It is, however, desirable that the latter officer establish a close touch by correspondence or otherwise, with the newly detailed military attaché as soon as his detail has been announced.

Education of the United States Army in Regard to the Work of Its Military Attachés.

Military information is divided into two classes:

(1) That collected by the General Staff in time of peace.

(2) That obtained by troops in the field after the outbreak of hostilities.

Information collected by the General Staff in time of peace concerning foreign armies and countries is chiefly derived from military attachés, the direct agents of the Military Intelligence Division, General Staff. These men have furnished in time of peace most

of the knowledge which is available to commanding generals at the moment of joining battle.

It is therefore essential that every American officer know something concerning the duties of these agents, the nature of the information they are expected to supply, its sources, and how it is obtained.

For this reason it is recommended that the course of study at all officers' schools comprise lectures on the duties and qualifications of military attachés. The subject need be treated only lightly in the elementary schools, such as West Point or the garrison schools; but at the Staff and War College it should be covered thoroughly.

In the past there has not existed in the Army at large a correct idea concerning the work, and above all the qualifications of military attachés. This misapprehension has led to appointments not in the interests of the service, and constitutes an additional reason for urging that the Military Intelligence Division insist upon the dissemination of correct ideas on this important subject, even to the extent of making propaganda in its interest. For such efforts would lead young officers to prepare themselves for this duty during a long series of years (and a very long time is needed for this preparation), while at the same time commanding officers would have a guide in making their recommendations when called upon.

Libraries, Etc.

In each military attaché's office there should be a working library containing all books with reference to the country in which the attaché is located, on the subjects of the geography, the history, and the economic conditions of the country. This should be purchased by the attaché himself from funds furnished for the purpose.

In addition to this the office should contain a collection of standard histories and up-to-date books on world politics.

The War Department should furnish all War Department publications, and also a catalogue of maps in order to prevent duplication in furnishing maps.

The attaché should have sufficient funds to subscribe to such standard political and military publications, both American and foreign, as are necessary to keep him thoroughly posted.

Relative Importance of Military Attaché Posts.

It being evident that the number of posts will always depend on the appropriations granted by Congress, it is considered essential that the War Department base and maintain its military attachés establishment on military principles, and combat all other influences which may be brought to bear.

It is therefore suggested that the following be adopted as the principles on which the military attaché establishment be maintained:

(1) The fundamental posts are those accredited to countries which, because of their military systems or geographical location, must be watched and studied in the interest of our own protection. *Example:* Japan and Mexico.

(2) The next most important are those countries which are actually the leaders in military science. *Example:* France and England.

(3) The third category embraces those countries, not included in the above, in which representation by the American Army is important because of the Monroe Doctrine. *Example:* Argentina and Chile.

(4) Next those smaller countries whose geographical location marks them as probable centers of propaganda or intelligence in time of war. *Example:* Switzerland and Holland.

(5) Lastly, all other countries, in order of their military interest to us.

Cooperation between the Naval and Military Attachés; Also with Occasional Representatives of Other Departments.

Cooperation between the naval and the military attachés in time of peace and above all in time of war, should not be left to the individual initiative of the two attachés, but should be made the subject of definite instructions to each officer from his department. It is within the experience of members of this conference during the present war that this cooperation could not always be effected merely by an exhibition of good will and a desire to be useful on the part of the two attachés. When differences of opinion or of methods exist, the military man desires and should always have, definite orders which cover the general case, to fortify and justify his action in the face of colleague.

Where two men are covering the same subject and each necessarily pursues his own methods, it is essential to prevent gaps and to quickly settle differences of opinion that recourse can be had to the decision of a common superior. It is an immense advantage when this superior is on the spot and appeals can be made in person; if he is at a distance and the case must be presented by cable or letter, delay and expense result.

For this reason it is urged that instructions to naval attachés and military attachés covering their cooperation should clearly prescribe that in all cases where differences of opinion exist concerning the extent and method of this cooperation the case should be presented to the ambassador or minister for his decision. It is equally desirable

that the State Department regulations should exact of the ambassador or minister that he give a decision in all cases. But the right of appeal from the decision should exist for both attachés, copy of each appeal being filed with the chief of mission. Pending a settlement of this appeal the decision of the chief of mission would be binding.

The cooperation between the naval and military attaché should have for its object the covering of all ground in the most efficient manner and avoidance of duplication of effort or the waste of money.

At each post a different problem would be presented and only the officers on the spot can decide upon the division of labor. It is, therefore, suggested that at each post where there exists a naval and a military attaché they should together draw up a scheme for the division and coincidence of their labors, both for time of war and for time of peace, and that this scheme be submitted for the approval or amendment of their chiefs in Washington.

At posts where only a naval or only a military attaché is usually stationed, it should be the duty of this officer to prepare a similar scheme which will provide for the case which would be presented if the other service suddenly sent, in time of emergency, a representative to look after its interests.

This report has dealt in another place with the subject of propaganda and with the matter of conferences to be held periodically between the chief of mission, consul, the naval and military attachés, etc. It is our idea that at these conferences the news cable would be prepared for Washington. If this is done the telegram would contain all the news important for State, War, and Navy Departments to have. It only remains for arrangements to be made in Washington for the immediate distribution of this cable to the three departments. But if most careful and efficient arrangements are not made for this immediate distribution, each department will inevitably begin to call upon its representative for cable news to be sent to it direct. It is this duplication of effort and of expenditure which it is desired to avoid. In time of war this duplication becomes serious, and of itself starts a divergence or even rivalry between the efforts of the naval and military attaché.

If, on the contrary, this cooperation and these conferences and the preparation of these telegrams become habitual in time of peace the habit will be continued in time of war.

The Departments of Justice and of the Treasury should be asked to give instructions to their representatives who occasionally are sent in war and in peace for special work in foreign capitals, that they confer with the naval and military attachés for a similar cooperation and mutual information.

Relation of the Military Attaché to the Other Personnel of the Embassy or Legation.

The embassy or legation should have a general clearing house of information of a political and economic character, which can only be obtained by frequent conferences among members of the embassy or legation and the consulate.

If the chief of mission does not, of his own motion institute periodical conferences as suggested above, it should be the duty of the military attaché to tactfully propose and endeavor to effect these meetings.

It is not regarded as desirable that all secret service of the embassy be under the military attaché for reasons that are obvious; but there should be an interchange of the information obtained by the agents of the different services to serve as a cross check.

The American Embassy or Legation abroad should be in complete harmony and the military attaché should contribute his part in making the legation a contented and happy one.

It is also suggested that all couriers belonging to the army in passing through the capital of any country be required to inform the military attaché of their presence in that country in order that the services of the courier may be utilized by the attaché.

Propaganda.

It is thought that the word *propaganda* is often defined as meaning "*the spreading of false information.*" Our policy in the distribution of public information is simply the spreading of the truth concerning the United States, her industries and policies, and in this way developing interest in the United States and friendly relations with foreign countries. Propaganda, as used by some nations, is not a weapon which the American people have need for, or would use were there that need. This form is that of attacking another by subtle slanders and lies. In foreign countries these cleverly concealed attacks are brought before the mass of the people. Some of the higher classes may doubt, but generally a statement once made and not contradicted immediately is believed.

Our country has no desire to use such propaganda, but our national self-defense demands the taking of some definite action. We desire the friendship of the world, and our national efforts to secure permanent peace have been greater than ever made by any nation in history. To secure international friendships and a permanent peace, nations must mutually understand one another, and we can not callously ignore insidious attacks, but these must be met by candor and our greatest weapon, the truth about American ideals. It is, therefore, recommended that the proper officials of the War Department submit to the authorities of our State Department a

suggestion to develop an American Bureau of Public Information in the various United States Embassies and Legations.

In war, it is realized that propaganda work produces the best result prior to a general offensive, and not during the attack. So propaganda must be functioning in times of peace if it is expected to help relieve international situations, as these come up from time to time. A famous diplomat of the war has recently been quoted as saying that propaganda will be 50 per cent of the work of diplomacy in the coming years. It is valuable to gain friends in another nation, to explain away misunderstanding, to win an ally, and, in some cases, to change a prospective enemy into a neutral state.

CLASSIFICATION OF BRITISH PRESS.

Source: Military Attaché.

11 September 1919.

(12137.)

The following report of 7 August was made by the U. S. military attaché, London. and is published for the information of the service:

The "Times."

Proprietor: Lord Northcliffe.
Editor: Mr. Henry Wicham Steed.
Policy: Independent, with Unionist trend, formerly semiofficial.
Standing: First class.
Price: 3d.

The *Times* is more than a newspaper—to the average Englishman it has in the past been an institution. It has usually been considered an oracle of wisdom, both at home and abroad, and its opinions quoted widely. Articles from the foreign correspondents are always of importance, and often influence British public opinion in matters of foreign policy. The importance of the *Times* as a leading journal can hardly be exaggerated.

For many years the *Times* belonged to the Walter family. More recently, the ownership was vested in a company of which Mr. John Walter became chairman. Lord Northcliffe later acquired a large interest in the company, and has since become the dominant figure in its control. Although his part in the actual ownership is merely a controlling one, the other shareholders have been content up to the present to permit him to shape the policy of the paper. Under his régime the *Times* has not until recently lost ground, either financially or journalistically. His introduction of business methods into its running turned an annual deficit into a profit last year of some £60,000. To be sure, however, such commercializing, with the consequent reduction in the amounts paid for special articles and perquisites of various sorts, has not been altogether advantageous.

A long succession of distinguished journalists have in the past edited the *Times* and maintained its distinguished reputation. It became for a long time the semiofficial organ of the British Government, irrespective of what party was in power. But after the election of 1906 it went into opposition to the Liberal Government, and gradually followed an independent unionist policy. This has been modified of course by the war and the party truce, and from 1914 to 1919, with the exception of the munitions incident, it has usually backed the Government in every political crisis. In recent months, however, owing to the coolness existing between Lord Northcliffe and Mr. Lloyd-George, a change in tactics has been made, probably foreshadowing its attitude as an opposition paper after peace has been signed.

Until February, 1919, Mr. Geoffrey Dawson was in charge of the editorial policy of the *Times*. His success was undoubted, and Lord Northcliffe had allowed him reasonable freedom from interference in his conduct of the paper. Its independent tone was altered by Lord Northcliffe toward the end of 1918, and Dawson, who was unwilling to sacrifice his principles, resigned in consequence. His successor as editor was Mr. Henry Wickham Steed, who had been for many years the Vienna correspondent, and an authority on foreign affairs in general and the Hapsburg domains in particular. He is hardly of the same caliber as his predecessor, his brilliance as a writer being more of an ephemeral sort, and his views neither so sound nor so conservative as the traditions of the paper would require. Wickham Steed is undoubtedly clever, but will follow without hesitation the instructions of Lord Northcliffe.

In view of the fact that the *Times* has lost its independence and now tends to become simply a Northcliffe organ, its position has been greatly impaired. The prime minister's characterization in Parliament of the *Times* as simply "a 3-penny edition of the *Daily Mail*" deserves consideration. The personal antagonism between Lord Northcliffe and Mr. Lloyd-George will certainly give the paper a new bias in coming months. Its future is therefore problematical—its standing at present diminishing. However, although its prestige is now suffering as the result of the vagaries of its proprietor, the *Times* is still far and away the greatest British newspaper.

The "Morning Post."

Owner: The Countess Bathurst.
Editor: Mr. H. A. Gwynne.
Policy: "Tory" Unionist.
Standing: High.
Price: 2d. now; before the war 1d.

The *Morning Post* is the oldest daily newspaper published in London. It has an established reputation as a conservative journal, and

is very well edited, although possessing only a small circulation. Its leanings are toward a benevolent despotism of the aristocracy and consequently the news published is colored accordingly. The *Morning Post* is probably what would be termed "a society paper," for more than usual prominence is given to the doings of the Court and the upper classes.

Politically, the *Morning Post* is "plus Royalists que le roi" and more Unionist than the Unionist Party. When the so-called National Party was organized, under Gen. Henry Page-Croft, a short time ago, this paper became its spokesman. Even during the party truce its attitude toward the Lloyd-George Government has been critical and at times one of suspicious contempt. But the foreign policy is of especial interest in view of its strong anti-American bias. Logically, therefore, its preference is for the Anglo-French entente as the guiding star of British diplomacy. The *Morning Post* has always been anti-American whenever the opportunity offered—it was so before the war, and became intensely bitter during the first part of the war, when the United States was neutral. In December, 1916, its readers were warned that America was likely to enter the war on the side of Germany. During recent months it has been very hostile to President Wilson and American policy at the Peace Conference. In a measure, of course, this attitude is assumed merely in opposition to the Liberal and Moderate Unionist efforts toward an Anglo-American rapprochement.

The paper is owned by the Countess Bathurst, but she has allowed its editor, Mr. Gwynne, a relative, freedom from outside interference. A subeditor, Mr. Ian D. Colvin, is said to write the more amusing and clever anti-American leaders. Its Washington correspondent, Mr. Maurice Low, brother of Sir Sidney Low, is in disfavor in the newspaper world, both in London and in Washington, inasmuch as it is believed that he is not playing the game.

The "Daily Telegraph."

Owner: Lord Burnham.
Editor: Sir J. Lesage.
Policy: Unionist.
Standing: High.
Price: 2d. now; before the war, 1d.

The *Daily Telegraph* is the youngest of the trilogy of great London newspapers, but journalistically perhaps the most successful. It was founded in 1855, but the paper was almost immediately taken over by the grandfather of the present Lord Burnham. In September, 1888, it was published at a penny, being the first daily paper to appear at that price. From the very start the leading articles have always been written by brilliant journalists, and its foreign correspondents have sent in noteworthy dispatches. The *Daily*

Telegraph has gone in for sensational articles, perhaps more so than its distinguished contemporaries, for example, in recent months, in installments, "My Four Years in Germany," by Mr. Gerard; "Belgium in German Occupation," by Mr. Whitlock; and "1914," by Lord French. It also printed Lord Lansdowne's famous letter in November, 1917, after it had been refused access to the columns of the *Times*.

Politically the *Daily Telegraph* is mildly Unionist, but its leanings do not prevent it from seeing both sides of an issue. The present Lord Burnham, who sat as Unionist M. P. for Mile End before going to the House of Lords, has exercised a wise and beneficial influence over the policy of his paper. It is probably more pro-American than any of its conservative contemporaries—an enterprise in which it shows especial interest is the Sulgrave Manor project. While it attempts to give the news in greater detail than any other paper, which combined with the poor paper and printing, makes it at times tedious reading, it is financially sound by reason of its advertisements. The *Daily Telegraph* is often termed "colorless"; it would be fairer to say that the policy of the paper is to be "safe" and to conform to the traditions of conservative British journalism.

The "Daily Mail."

Owner: Lord Northcliffe.
Editor: Mr. Thomas Marlow.
Policy: Independent Unionist.
Standing: Jingo paper.
Price: 1d. now; before the war ½d.

The *Daily Mail* was founded by and is the leading organ of Lord Northcliffe. It is the most sensational and aggressively jingo paper of the morning papers and has a large circulation among the middle and lower classes. Its policy is the personal opinion of Lord Northcliffe at the moment, and as such changes quite frequently, retaining generally an independent Unionist tinge.

In contrast to other journals of this sort in London, the *Daily Mail* is almost pro-American in its leanings. This was particularly in evidence immediately after Lord Northcliffe's return from the United States, after having for some months acted as chairman of the British War Mission there. While the *Daily Mail* has been a newspaper success, it must be noted that the men who have made it such are now old men, and its future will depend on the ability of Lord Northcliffe to find capable substitutes for them.

The "Daily Express."

Owner: Syndicate headed by Lord Beaverbrook.
Editor: Mr. Ralph Blumenfeld.
Policy: Unionist.
Standing: Second class.
Price: 1d. now; before the war ½d.

The *Daily Express* is said to have but one ambition—to best the *Daily Mail*—and its standing may be judged from this statement, whether or not true. It was a distinctly inferior newspaper until taken over, some time ago, by a company of which Lord Beaverbrook is the leading backer. Since that time it has improved and is rapidly cutting into the circulation of its chief rival.

The policy of the *Daily Express* is presumably Unionist, but it is influenced by the desires of its proprietor, Lord Beaverbrook, formerly Sir Max Aitken. Lord Beaverbrook is a Canadian financier, who has been engaged for many years in politics in England, and has been remarkably successful, for he was said to have a hold on both the present prime minister and his predecessor. During the war he became minister of information, which rôle he filled with distinction. He has, however, permitted his paper to show a strong anti-American bias, its leading articles in recent months having been very bitter against President Wilson.

The editor of the *Daily Express* is Mr. Ralph Blumenfeld, American of German-Jewish origin, and a writer of some ability. His paper is probably closer to Scotland Yard than any of its contemporaries.

The "Daily News."

Owner: Mr. George Cadbury.
Editor: Mr. A. G. Gardiner.
Policy: Liberal (Independent).
Standing: Second class.
Price: 1d. now; before the war ½d.

The *Daily News* is the most important of the few Liberal journals in London. As such it has acted as the spokesman for the Liberal Party and more recently for the Independent Liberal members in the present House of Commons. Its circulation is large in the home counties outside London and in Wales.

During the war its policy of radical liberalism took on at times almost a pacifist character. It must not be forgotten that the paper has been against the war, and on the morning of the declaration of war had urged England to remain neutral and make profits by selling munitions to each side. Consequently, since 1914, it has shown neither independence nor initiative in spurring on the Government in the prosecution of hostilities to a successful issue. It has been anti-Lloyd-George and was bitterly attacked by the prime minister

in his speech on the Maurice Division. However, as redeeming features, this paper has been consistently pro-American, has supported President Wilson at the Peace Conference, and has been a pioneer in the field as regards the League of Nations project. Its editor, Mr. A. G. Gardiner, is a very able writer.

The "Daily Chronicle."

Owner: Sir Henry Dalziel, M. P. (head of a controlling syndicate).
Editor: Mr. E. G. Perris.
Policy: Liberal (governmental).
Standing: Second class.
Price: 1d. now; before the war ½d.

The *Daily Chronicle* has been in the past and continues to be a leading Liberal organ. As such it has an exceptionally large circulation in constituencies where there is a large Liberal electorate, particularly in Wales. Furthermore, its leaders are now of interest as reflecting the views of the present Government—at present the paper enjoys almost a semiofficial character.

Until a short time ago the *Daily Chronicle* was owned by the Lloyds and edited by Mr. Robert Donald. The editorial policy was governmental, as Donald was a great admirer of Mr. Lloyd-George and helped in the overthrow of the Asquith Cabinet in 1916. But in 1918 Donald disagreed with the prime minister on Irish conscription, and began to oppose him. The control of the paper was therefore bought over his head, and he was dismissed from office.

The new proprietors were a syndicate in which Sir Henry Dalziel was the moving spirit, the other shareholders being Mr. Andrew Weir, Mr. Charles Spicer, and Sir Charles Sykes, M. P.; Lord Beaverbrook had also attempted to purchase the *Daily Chronicle* but the personal equation was not in his favor. Under the new arrangement the paper has done well and is being conducted successfully by Mr. E. G. Perris, the editor. At present it shows an inclination toward closer Anglo-American relations.

The "Daily Herald."

Owner: Syndicate.
Editor: Mr. George Lansbury.
Policy: "Labor" and social revolutionary.
Standing: Distinctly second rate.
Price: 1d.

The ownership, policy, and influences surrounding the *Daily Herald* will form the subject matter of a separate memorandum.

PICTORIAL PAPERS.

The "Daily Mirror"; *owner*, Lord Rothermere; *editor*, Mr. E. Flynn.
The "Daily Sketch"; *owner*, Sir E. Hulton; *editor*, Mr. J. N. Riddle.

The "Daily Graphic"; *owner*, Messrs. Lloyd; *editor*, Mr. J. M. Bulloch.

The pictorial dailies have little if any political policy—they follow the inclinations of the crowd. The attitude is thus similar to a weathercock, both as regards foreign and domestic politics. The pictorials have, however, a large circulation, and of these as a money-maker the *Daily Mirror* has been the most successful. The other two papers are of no outstanding importance.

EVENING PAPERS.

The "Evening Standard."

Owner: Sir E. Hulton.
Editor: Mr. A. H. Maun.
Policy: Moderate Unionist.
Standing: First class.
Price: 1d.

The *Evening Standard* is owned by a company in the Midlands of which Sir E. Hulton is the leading partner, and in which Lord Derby is also interested. The same organization owns the *Daily Sketch*, the *Sunday Herald*, and the *Daily Despatch*, of Manchester. The policy of the *Evening Standard* is directed to the formation of a Center Party to support the Coalition government—such a political grouping to embrace the Moderate Unionists and the Coalition Liberals. The *Evening Standard* is well edited and is the best of the evening newspapers. It is inclined to be pro-American.

The "Pall Mall Gazette."

Owner: Sir H. Dalziel, M. P.
Editor: Mr. Donald Sutherland.
Policy: Coalition Liberal.
Standing: High.
Price: 1d.

The *Pall Mall Gazette* is a reflex of the views of Sir Henry Dalziel. Both in policy and make-up it resembles the *Evening Standard*, and its standing is very much the same.

"Westminster Gazette."

Owner: Right Honorable Sir Alfred Mond, M. P.
Editor: Mr. J. A. Spender.
Policy: Liberal (Independent.)
Standing: High.
Price: 1d.

The *Westminister Gazette* is probably the best edited of the three leading evening papers. It should be borne in mind that the evening papers are very inferior to the morning ones, both in size, news, and advertisements—and in general quality. Although, as a Liberal organ, many of its leaders are discounted, the *Westminster* has a

large circulation in the upper classes by reason of its carefully written articles and the very able presentation of news. In policy it stands between the *Daily Chronicle* and the *Daily News*; it is, of course, pro-American.

The "Globe."

Owner: Mr. Dudley Docker.
Editor: Mr. L. J. Maxse.
Policy: Ultra-Tory Unionist.
Standing: Jingo.
Price: 1d.

The *Globe* is the most rabid of the London jingo press, and in its policy is more Unionist than the *Morning Post.* It is an inferior sort of paper and its circulation small. As can be judged, it is anti-American and bitterly against President Wilson.

The "Evening News."

Owner: Lord Northcliffe.
Editor: Mr. Walter Evans.
Policy: Independent Unionist.
Standing: Poor.
Price: 1d.

The *Evening News* is the sports newspaper of the British workingman, and as such is a poor paper from the journalistic standpoint. It is the biggest money maker of the evening papers. Lord Northcliffe is said to recoup his losses on his other dailies by his profits from this. Its policy and standing are as befits an evening edition of the *Daily Mail.*

The "Star."

Owner: Mr. G. Cadbury.
Editor: Mr. Ernest Parke.
Policy: Liberal (Independent).
Standing: Poor.
Price: 1d.

The *Star* endeavors to compete with the *Evening News*, but only with a fair amount of success. It is an organ of Radical Liberal views, but is practically an evening edition of the *Daily News.* It is favorably inclined toward America, but otherwise of little importance.

SUNDAY PAPERS.

The "Observer."

Owner: Maj. Waldorf Astor, M. P.
Editor: Mr. J. L. Garvin.
Policy: Independent Unionist.
Standing: First class.
Price: 2d.

The *Observer* is far and away the best Sunday or weekly newspaper published in Great Britain. It is exceptionally well edited, and

always contains several articles on special subjects by writers of merit. As a paper with a famous tradition behind it, the *Observer* stands for all that is best in journalism.

The policy of the *Observer* is mildly Unionist, but supporting the present coalition Government. The editor, Mr. J. L. Garvin, is a free lance, and at times displays rather extraordinary views. His leaders are well written and frequently brilliant. The *Observer* has been very pro-American and has backed President Wilson and the League of Nations idea. It has also in the past made very kind allusions to Mr. Page.

The "Sunday Times."

Owner: Mr. William Ewart Berry.
Editor: Mr. James Douglas.
Policy: Unionist.
Standing: High.
Price: 2d.

The *Sunday Times* is a weekly journal of high merit, although it does not come up to the standing of the *Observer*. However, in make-up and appearance it resembles closely this contemporary. It is entirely independent of the Northcliffe press and pursues a Coalition Unionist policy. The *Sunday Times* is usually favorable toward closer Anglo-American relations.

The "Weekly Despatch."

Owner: Lord Northcliffe.
Editor: Mr. Bernard Falk.
Policy: Independent Unionist.
Standing: Second class.
Price: 1d.

The *Weekly Despatch* is the Sunday organ of the Northcliffe press, and as such its policy needs no explanation. In merit it stands about halfway between the *Daily Mail* and the *Evening News*. It publishes a column or so of special items entitled "Secret history of the week." This is worthy of attention, for Northcliffe at times expresses his own personal views on topical subjects.

"News of the World."

Owner: Sir George Riddle.
Editor: Sir Emsley Carr.
Policy: Variable.
Standing: Second rate.
Price: 1d.

News of the World is the workingman's summary of the doings of the week. It is a hodge-podge of information, thrown together in a hasty manner. This paper is the sort that its lower-class reader will go through from beginning to end, taking in everything, including the advertisements. The leaders are of no fixed policy, but follow

the inclination of the crowd. The importance of *News of the World* lies in the fact that its circulation is over 2,000,000.

The British worker, who reads but little, can be reached best through the columns of such a newspaper. Between its second-rate articles, the sporting news, and sensational accounts of the murder and divorce-suit cases, items are often inserted which exercise much influence. It is no doubt true that the laboring man gets half of his political views by reading leisurely, in his shirt sleeves, his Sunday paper—a journal of this character.

"Lloyds Weekly."

Owners: Messrs. Lloyd.
Editor: Mr. E. A. Perris.
Policy: Variable (usually Liberal).
Standing: Second class.
Price: 1d.

Lloyd's Weekly is of the same character as *News of the World*—simply a workingman's Sunday paper. Its circulation is about 1,500,000. It is like its contemporary in form, make-up, and policy.

The "Sunday Pictorial."

Owner: Lord Rothermere.
Editor: Leading article by Mr. Horatio Bottomley, M. P.
Policy: Variable but jingoist.
Standing: Second rate.
Price: 1d.

The *Sunday Pictorial* is probably the biggest journalistic success ever achieved. Founded in 1915, it has in four years obtained a circulation above 2,750,000. In its policy, presentation of news, and the type of reader to which it appeals, it resembles contemporaries such as *News of the World.* By its pictures and articles by Horatio Bottomley it has become enormously popular among the lower class. It is the greatest money-maker of any of the newspapers, and has reached the point, both as regards circulation and advertisements, where any increase in either causes a decrease in profits.

The paper has no policy, but Bottomley, who is a jingo and more or less of a demagogue, is anti-American.

The other weekly newspapers, including the *National News*, *Reynolds Weekly*, *The People*, and *Sunday Evening Telegram*, are of no outstanding importance either as regards policy or circulation.

The "Manchester Guardian."

Director and editor: Mr. Charles P. Scott.
Policy: Liberal.
Standing: High.
Price: 1½d. now; before the war 1d.

The *Manchester Guardian* is the only provincial paper of outstanding importance. While the *Glasgow Herald*, the *Sheffield*

Telegraph, and the *Liverpool Post* may have large circulations, the *Guardian*, as the leading organ of the Liberal Party, has always made the widest appeal. Both as regards editorials and special articles, it is a well-written journal.

The *Guardian* follows the Radical-Liberal trend as regards foreign policy and labor questions. Unlike, however, the *Daily News*, it has in a measure backed the Lloyd-George Government, though it maintains its independence in so doing. As a Manchester paper, it has always been close to American affairs and is for President Wilson. During the war it has warmly supported him and his principles.

AVIATION.

AVIATION NOTES.

Source: Reliable.

20 October 1919.

The first part of a new balance at the wind tunnel has been completed and several satisfactory tests have been held. The new balance measures moments to within one thousandth of an inch-pound.

A chronograph, to be used in detailing the velocity of a shipboard airplane when taking off, is under construction.

The Secretary has authorized the purchase of three experimental ship planes, to be built by the Gallaudet Aircraft Corporation.

Bureau of Ordnance has forwarded to the U. S. S. *Shawmut*, for tests, two telescopic high altitude bomb sights and one low altitude bomb sight fitted with an additional corrector bar for the course and speed of the target.

The Secretary has authorized the purchase, at a cost not to exceed $2,000,000, of the British *R–38* rigid dirigible.

The recently constituted Army and Navy Helium Board held its first meeting on Thursday. This board is composed of one member from the War Department and one from the Navy Department, and has been constituted for the purpose of coordinating the Army and Navy in the production of helium. A representative of the Department of the Interior will be appointed for the purpose of conferring with the board on all matters that would interest the Department of the Interior.

The conclusion reached after inspection of all American single seaters at McCook Field, Dayton, Ohio, and after conference with Army engineers and test pilots, is that the Loening monoplane is substantially equal to any of them in performance and is the only one which is practicable for maintenance in the field. The bureau is therefore recommending this machine, equipped as a single seater, to the Marine Corps.

The Fleet Air Detachment has devoted most of its time to setting up two one and a half strutter Sopwith *1A–2's*, which should be ready in the near future. Minor repairs have been made on the *SE–5*.

Experiment of drag-roping over water was tried with the free balloon. The experiment was very nearly disastrous to the crew of the balloon. While drag-roping the basket touched the water,

became filled, and the pilot was unable to get it off the water again. For half an hour the balloon remained in this condition, drifting slowly toward a fleet of oyster fishermen in Delaware Bay. By that time a great amount of hydrogen had been spilled through the appendix due to the balloon flapping back and forth in the wind. The pilot then decided that it would be necessary to cut free the basket, as all ballast had been expended in a previous attempt to get off.

Four students and a pilot were detailed to remain in the load ring, which still had the drag rope attached, and one pilot and a student were to remain in the basket. This maneuver was successfully carried out and the number of men decided upon in each case was found to be correct, as the balloon would hardly have lifted any more than it did and gain the distance necessary to land, and the basket would not have supported three men for the length of time that it supported the two.

The pilot in the balloon valved down from an altitude of about 4,000 feet to the tree tops, where one of the students was swept off. He fell down through the trees and landed unhurt. This caused the balloon to rise again and it was again valved down to the tree tops, where two more students were swept off. These also landed unhurt. Again the balloon rose, and was again valved down; the pilot and the remaining student then ripped the balloon about 30 feet from the ground and landed safely. In each case, as the men landed from the balloon, they made every attempt to get boats and reach the men left in the basket. Lieut. (J. G.) Emerson, the last one to land from the balloon, was the first one to reach the basket. He secured a motor boat, and, taking a doctor along with him, picked the two men up a little more than five hours after they had cut the balloon free. No ill effects were suffered by either of these two from the prolonged drifting in the basket.

A boat from Coast Guard Station No. 137 arrived on the scene about three minutes after Lieut. Emerson and the two men were transferred to this boat and took passage in it back to Cape May, N. J.

In the meantime the other students who landed had telephoned back to the air station, and from there had been dispatched submarine chaser *No. 428*, seaplane *A–1306*, and Italian dirigible *O–1*. The submarine chaser and the plane passed near to the men in the basket, but did not see them because they were so low in the water. The dirigible was a little behind in leaving the station, but was taking the right direction and had equipment on board to make the rescue even with the sea as rough as it was and in the wind of 25 miles an hour that was blowing all day.

On Thursday, October 9, 1919, a 35,000-cubic-foot capacity free balloon shoved off on a night flight. The crew consisted of Ensign

Gordon G. MacDonald, pilot, and Capt. Stanley V. Parker, U. S. Coast Guard, as assistant pilot. Extremely favorable winds prevailed, carrying the balloon northwest over Florida and across the swamp lands at the head of Mobile Bay, thence northerly through Alabama and Mississippi to the Tennessee line, across Tennessee into Kentucky, where a landing was made 20 miles south of Bowling Green, Ky., after 21 hours and 10 minutes of flight.

Eight pigeons were taken along and released at intervals between 30 and 50 miles from the station, of which 6 have returned. Of the 12 pigeons taken out by Lieut. Masek on Thursday, October 2, and released over Georgia and South Carolina, only 3 have returned. A communication from J. R. Simms, of Roanoke, Ala., addressed to Lieut. Masek at this station, stated that 1 of the pigeons had joined his flock and that he has been unable to induce it to leave his farm.

AVIATION IN JAPANESE ARMY AND NAVY.

Source: Reliable.

9 October 1919.

Military Aviation.

There is an aeroplane factory at Tokorozawa, which is capable of producing 45 aeroplanes, without motors, a month. If necessary the factory could turn out hydroplanes. Repairs to aeroplane motors can be done at the works at Tokorozawa.

At Nagoya a motor (aeroplane) factory has just been built. The factory is now turning out Salmson Z.9 motors, but it would be possible to turn out any kind of motor. In a very short time this factory will be able to turn out one motor a day.

The steel works at Kure, Omori, and Yamata, are able to produce the special kind of steel needed in the making of motors.

At Gifu there is an aerodrome with a large school for the training of pilots.

At Kagamigahara there is a school of fire and bomb training.

Up until now about 20 really good pilots have been found among the large number of aviation students.

Aeroplane accidents are numerous; organization is lamentable.

At the present time there are two battalions of aviators who are receiving instruction. One battalion is at Tokorozawa and the other at Gifu.

So many aeroplanes are being used for instruction purposes that there are actually not more than 30 (about) aeroplanes for really military purposes.

Naval Aviation.

For the moment everything which has to do with naval aviation is concentrated at Oppama near Yokosuka. The aviation center in-

cludes a school of pilotage and bombardment, an air commission, an aerodrome, hangars, storehouses, and repair shops. There are no dirigibles at Oppama, but there is one captive balloon.

At the present time there are about 20 officers undergoing instruction as pilots-observers at Oppama; also a few warrant officers and sailors.

There are 5 officers who act as heads of departments or instructors. The staff is composed of at least 1 captain, a number of commanders, and about 10 naval constructors. The last named spend their whole time in the aviation service. They do construction and repair work, but a few of the constructors have pilots' licenses. At the moment there are about 100 pilots already trained (50 officers and 50 warrant officers and marines). The organization consists of 400 men, 100 pilots, 150 mechanics recruited from among the workmen, and 150 auxiliary men for drill purposes.

Recruiting is voluntary, but the applicant must show sufficient aptitude for aviation.

The course of instruction lasts one year, and no distinction is made between pilots and observers. All have to undergo the same training. The instruction does not appear to be given in a very practical way. It seems to be very incomplete.

After finishing the school course the officers serve a probationary period on the staff.

Distribution of air units: 1 small squadron at Oppama (6 Shortt 220 h. p., 5 Tellier 200 h. p., and 2 Farman 100 h. p.) ; 1 small squadron on an aviation boat (2 200 h. p. Hispano machines at Yokosuka). It is the intention of the naval authorities to make a second aviation base in the vicinity of Kure.

The following machines are actually in service:

A. About 20 Maurice Farman hydroplanes (1919) with 100 h. p. Benz motors. The above machines are old and incapable of any serious work. They weigh 1,400 kilos with 2 passengers, but without machine guns. These machines are used in the school.

B. 6 Shortt hydroplanes, with 220 h. p. Sunbeam motors. These machines are rigged as spar torpedo boats, but they are of the most ancient model.

C. 5–200 h. p. Tellier hydroplanes. These are good machines but the Japanese do not know how to handle them.

D. 1 Tellier flying boat with 200 h. p. Hispano motor. It is a good machine. Speed 165 kms. per hour. Adjustable wings.

The following motors are in service:

70 h. p. Rhone, 80 h. p. Renault, 100 h. p. Benz, 200 h. p. Benz, 200 h. p. Hispano-Suiza, and 220 h. p. Sunbeam. The 100 and 200 h. p. Benz motors are made at the Yokosuka arsenal. They are heavy.

There is no precise information as to the armament of aeroplanes.

COMMUNICATIONS.

IMPERIAL COMMUNICATIONS COMMITTEE.

Source: Reliable.

22 October 1919.

The formation of the "Wireless Board" in the summer of 1917 really gave rise, indirectly, to the formation of the I. C. C. (Imperial Communications Committee). Before the summer of 1917 there had been, of course, cooperation between the fighting services and between the latter and other Government departments, but such cooperation often took the form of a formal letter from one department to another, this leading to an equally formal reply, which often led to prolonged correspondence on matters which could really have been settled in a few minutes by conversation between the responsible officials of the several departments.

The W/T Board was accordingly formed. Accommodation and secretariat were provided by the Admiralty; but it was not until after the first few weeks that it really became an Admiralty department. The chairman of this committee was to be neutral. The Admiralty, War Office, and Air Ministry are each represented by two or more *nominated* delegates, who are, however, allowed to send substitutes or to bring assistants if they desire.

Meetings are held regularly once a week. The W/T Board has done a great deal of work, not only in coordinating the fighting requisites of the services, but in passing upon technical papers for publication, advising upon necessary restrictions of W/T apparatus, and upon patenting of inventions made in the technical establishments of the services.

The decisions of the W/T Board have never been executive. In the majority of cases, however, where the opinion has been unanimous, its conclusions have been immediately put into effect, by the representative concerned going back to his office and initiating the required action.

Even before the armistice the need for a larger committee, more representative of the Government, and carrying more weight, was felt; and an invitation to the post office to take part in the deliberations of the board was accepted. It was found that any matter affecting only the fighting services could be very quickly arranged, whereas one involving any of the civil departments inevitably required much paper work, time, and patience.

Accordingly, it was impressed upon the cabinet in 1918 to set up an advisory committee, under an impartial head, representative of all Government departments interested in any form of telegraphic communication (land lines, cable, wireless and visual). There was considerable difference of opinion as to whether the committee should possess executive or merely advisory powers. The cabinet finally decided, in very general terms and without going into the question of powers, to set up a committee of the cabinet, under the chairmanship of a representative from the Colonial Office, with representatives of the Admiralty, War Office, Air Ministry, Port Office, Foreign Office, Board of Trade, India Office, Colonial Office, and Treasury. The secretariat was provided from that of the War Cabinet.

There had been a good deal of discussion as to how the self-governed Dominions were to be represented or consulted; the idea had been that as soon as the home government had set up its own committee, the Dominions should each be invited to set up in their own Governments a similar committee, and to appoint a representative from their offices in London to attend the I. C. C. This has not been done as yet; but India has already taken steps to form a committee of this kind; and it seems probable that the whole scheme will eventually be placed on a working basis along the lines indicated.

The representations of the various departments on the I. C. C. are all definitely nominated by the several ministries. They are the heads of the departments responsible for telegraphic work. In the case of the Admiralty, the representative is the Director of the Communication Division of the Naval Staff, who corresponds to the Director of Naval Communications in the Navy Department. These representatives may bring assistants or may nominate substitutes to attend the full meetings; but it is very rarely that substitutes are sent.

The full meetings are not at present held on predetermined days. The average so far has been about one a month.

One of the first acts of the I. C. C. was to constitute a wireless subcommittee under the chairmanship of a member of parliament. This subcommittee has the same membership as the main committee; but departments not affected by the subject under discussion usually do not send their representatives. The subcommittee examines in detail such matters as may be referred to it by the main committee, and sometimes delegates this work to a smaller conference of two or three.

The proceedings of the subcommittee are not effective till approved by the main committee, but one of the great means of saving time is the scheme recently started which enables any department to request the secretary of the I. C. C. to place some new wireless matter directly before a subcommittee. The same procedure can be adopted for proposals which originate in the W/T Board.

The future of the W/T Board is now under consideration, as the present chairman will shortly retire.

The W/T subcommittee meetings are held once a week, with occasional omissions; but when a large question arises, two weekly meetings are often held.

The question of executive functions of the I. C. C. has not been definitely settled; but in cases where cabinet approval has been required, this has been obtained by the chairman writing memorandum to the cabinet summarizing the conclusions of the I. C. C. and the arguments which led up to them.

The I. C. C. has proved to be a most valuable institution, and it is thought that it will become a permanent institution in times of peace.

ENGINEERING.

A REPORT ON THE SULZER TWO-CYCLE MARINE DIESEL ENGINE.

Source: Reliable.

23 October 1919.

The engine is built with four working cylinders, one double-acting scavenge air pump, one three-stage air compressor, and various auxiliary pumps. It works on the well-known two-cycle principle with port scavenging (Sulzer patent); i. e., scavenging is effected through two sets of slots arranged circumferentially in the cylinder opposite the exhaust slots, the upper row of slots being controlled by means of a rotary valve in such a way that they open after the pressure of the exhaust gases in the cylinder has reached its lowest point and do not close until after the piston on its upward stroke has entirely covered the exhaust slots, whereby it is possible to deliver a surplus charge of fresh air into the cylinder.

Description.

Working cylinders.—The working cylinders are fitted with renewable cylinder liners. Cylinder jackets and liners are made of special iron and cooled by sea water. The cooling chambers are easily accessible through "hand holes" arranged in the jackets for cleaning purposes. The cylinder jackets are flanged at the bottom for bolting to the frames. The exhaust gases are led away through slots in the cylinder wall and the scavenge air is introduced through two rows of slots arranged opposite the exhaust side. Both the exhaust and the lower row of scavenging slots are controlled by the piston alone, the upper row of scavenging slots being controlled by a rotary piston valve which is located in the scavenge air receiver and driven from the governor shaft through helical gear wheels.

Cylinder cover.—The cylinder covers are of cast steel and on account of the abolition of the scavenging valves very much simplified. There is only one central opening for the combined fuel and starting valves. All surfaces are equally and efficiently cooled. Access for cleaning the cooling chambers is provided for.

Valves.—The fuel, starting, and cylinder safety valves are arranged in one common, water-cooled valve cage of special cast iron. The main starting valve is provided with an auxiliary or advance-

starting valve which eminently enhances the reliability. The auxiliary starting valve can be dismantled whilst running.

The fuel valve is of the inclosed type with torsion shaft and stuffing box; sticking of the valve is excluded.

Piston.—The pistons are made in two portions, the piston body is of special cast iron and the top of cast steel. They are cooled by sea water through a set of telescopic tubes. The cooling water enters the cooling chamber in the form of a free jet mixed with air. The water returned freely into open funnels fixed outside to the engine frames. The whole piston cooling device can be very easily dismantled and gives no trouble whatever.

Piston rods.—These consist of forged Siemens-Martin steel. Both ends are flanged and bolted to piston and crosshead.

Crossheads.—The crosshead pins are of crucible steel and bored out. Cast-steel slippers lined with white metal are mounted to both ends. Liners are fitted between crosshead and piston rod by means of which the compression can be adjusted.

Connecting rods.—These are made of forged Siemens-Martin steel and have a length of four to five times the crank radius. The upper end is forked, and both ends are provided with forged heads. All connecting rod bearing brasses have a round cross section and are of cast steel lined with white metal. The brasses are fitted with liners for adjusting the clearance.

Frames and crosshead guides.—The box type frames are of cast iron, which take up the whole thrust, and fitted with easily detachable oil-tight steel plate covers. On the valve gear side these covers are provided with inspection doors.

The crosshead guides are bolted to the frames and arranged for internal water cooling. The clearance between the guides and slippers can be adjusted by means of thin brass liners on the crosshead. Special boxes for catching leaking oil are arranged at the bottom end of the guides.

Crank case and main bearings.—The crank case consists of four cast-iron parts with strong stiffening ribs. The various parts are bolted together by means of strong flanges. An oil trough of steel sheeting is arranged beneath the bedplate.

The main bearings have a round square section, the shells being made of cast iron lined with white metal. Special liners are fitted for adjusting the clearance. A system of forced lubrication is provided throughout. The crank shaft is built up. The pins and webs are shrunk on hot. Crank pins and journals are of best quality Siemens-Martin steel, the webs of cast steel. The crank shaft for the working cylinders consists of two identical portions with forged coupling flanges. The cranks of each shaft portion are arranged at

an angle of 180° to each other and the two pairs of cranks at an angle of 90° to each other.

The crank shaft for the scavenge pump and air compressor is forged of Siemens-Martin steel and coupled to the main shaft. A small crank is bolted to the extreme end for driving the cylinder cooling and oil pumps.

Flywheel and turning gear.—The former is of cast iron and bolted to the flywheel shaft. The turning gear is driven by compressed air.

Air compressor.—The engine has a three-stage vertical air compressor which supplies the necessary starting and injection air. It is large enough to deliver sufficient air for injecting the fuel oil for the two main engines in a twin-screw ship. The valves are of the approved automatic ring pattern of nickel steel and easily accessible. Efficient intercooling and draining is provided to each stage, by which means high temperatures and oil or water deposits in the high pressure air bottles and tubes are entirely obviated. Cooling is effected by sea water.

The injection air pressure can be adjusted (according to the load) by throttling the air inlet to the first stage. The pistons are connected to the forced lubricating system.

Scavenge air pump.—The scavenge pump, like the air compressor, is arranged vertically above the crank shaft in line with the working cylinders and driven direct from the crank shaft. It is of the double-acting type provided with automatic ring valves.

The fuel pump is of the multiplunger type, one plunger for each cylinder. The plungers are fixed to a common crosspiece worked by an eccentric from the vertical governor shaft. The fuel oil flows by gravity from a reservoir to the common suction chamber through a double set of filters, whence it is forced to the fuel valves. Two nonreturn valves arranged in series are provided in each connecting pipe between fuel pump and fuel valves.

The fuel supply to the working cylinders is controlled by hand through varying the lift of the suction valves. These valves can also be adjusted from outside by hand and by means of the same arrangement any of the cylinders can be cut out during service.

A safety governor arranged on top of the vertical shaft will cut off the fuel supply when the admissible maximum number of revolutions is being exceeded.

Valve gear and reversing mechanism.—The valves are operated by means of a double set of cams for ahead and astern running mounted on a horizontal shaft arranged alongside the cylinders. The cam shaft is driven from the crank shaft through the medium of vertical shaft fitted with carefully machined helical gear wheels.

Starting up is effected by compressed air on all cylinders. After the engine has obtained sufficient speed the air supply is shut off and the fuel supply thrown in successively. This performance is achieved by moving first one lever for two cylinders in the "running" position and as soon as these fire the lever of the other two cylinders is also brought in the "running" position. The starting and reversing operations are effected by means of an air-driven motor.

The method of reversing is of surprising simplicity. It consists in the provision of two separate cams and rollers for each valve to be operated and in a simple mechanism for moving the proper roller into contact with the respective cam, as the desired direction of running may require. A special designed arrangement will only allow reversing the engine when the levers are in the "stop" position and to start up when they are in the "ahead" or "astern" position.

The valve gear also controls automatically the fuel supply whilst maneuvering. The lift of the fuel needle can easily be adjusted by the reversing handwheel both for "ahead" or "astern" running, whereby the advance opening period of the needle never varies. The advantages of this arrangement are smokeless combustion at all loads and great saving of fuel and injection air.

The operating gear for starting and reversing is located near the center of the engine on the upper platform. The starting and reversing operations can easily be carried out by one man.

Auxiliary pumps.—Two double-acting cylinder-cooling water pumps and one lubricating-oil pump are arranged on the forward end of the engine and driven direct from the crank shaft. The piston cooling, bilge, and closet pumps as well as the crosshead-pin lubricating pump are located on the exhaust side of the engine and operated by means of rocket arms from the scavenge-pump crosshead.

Lubrication.—All main and big-end bearings as well as crosshead guides and pistons are lubricated by a forced lubricating system. The engine is totally enclosed. All drip oil is collected in the oil trough arranged underneath the crank case, whence it flows to the oil pump through a suction filter. The crosshead-pin bearings are lubricated from a special pump which delivers the oil at a high pressure through a set of telescopic tubes to the bearings. The main, scavenge pump, and compressor cylinders are lubricated from small piston pumps, the quantity of oil being regulated by sight feeds.

Cooling.—Sea water is used for cooling throughout. The cylinder and piston cooling pumps are of such capacity as to supply sufficient water for two engines in a twin-screw ship even in tropical waters. The inlet pipes to the pistons and the outlet pipes from the cylinders are each provided with a regulating cock.

Pressure gauges, tachometer, revolution counter.—The engine is provided with the accessory gauges, tachometer, and revolution counter.

Air bottles and pipings.—Each engine will be supplied with one injection and some starting air bottles of Siemens-Martin steel fitted with suitable valve heads. The high-pressure pipings are all made of seamless-drawn steel tubes. All cooling water pipes are of copper.

Test Results.

The engine was started up the first time on the 8th of May, 1919, and very extensive trials of all kinds have been carried out up to this date. Special attention was given to the working gear and the reliability of the motor. For ascertaining the output of the engine it was coupled direct to a Heenan & Froude dynamometer, and in the following the output of the engine thus obtained is described as effective output.

The leading dimensions of the engine are as follows:

Number of working cylinders	4
Diameter of cylinder	600 mm.
Piston stroke	940 mm.
Effective output (Ne)	1,250 b. h. p.
Normal speed	100 r. p. m.

The tests may be subdivided in the following groups:

(1) Trials with normal full load Ne=1,250 b. h. p. and n=100 r. p. m. running on different sorts of fuel oil, viz, gas oil, tar oil, mazout, and Mexican crude oil.

(2) Trials with decreasing number of revolutions, according to propeller law (proportional n^3).

(3) Trials with constant speed, N–100, a load decreasing.

(4) Maneuvering trials.

(1) Trials with Normal Load, Ne=1,250 b. h. p. and n=100 r. p. m. with Various Fuel Oils.

The engine was successively run on gas oil, tar oil, mazout, and Mexican crude oil.

The fuel consumption per b. h. p. at Ne–1250 b. h. p. and n–100 r. p. m.

With gas oil was 190; tar oil, 215.5; mazout, 194; Mexican crude oil, 203.5 grams.

During these consumption tests all auxiliary pumps were driven direct from the engine.

A further trial run was carried out with the auxiliary pumps (cylinder, piston cooling, bilge, and closet pumps) disconnected. The fuel consumption with gas oil was 188.4 gr. per b. h. p. hour.

(2) Trials with Decreasing Speed According to Propeller Law (Proportional n^3).

(With direct driven auxiliary pumps.)

These tests were also carried out with all of the aforementioned fuel oils. The exhaust was faultless at all speeds and loads.

(3) Trials with Constant Speed (n=100 r. p. m.) and Load Decreasing.

The tests were made on gas oil and the exhaust was invisible at all loads.

(4) Maneuvering Trials.

In order to test the maneuvering capacity of the engine a series of varying maneuvers were made with gas oil, tar oil, mazout and Mexican crude oil. Slow speed and starting maneuvers can just as easily be performed with either tar oil, mazout, or Mexican crude oil as with gas oil.

It is possible to decrease the speed to 30 r. p. m. without cutting out any cylinders.

Starting and reversing can be effected very quickly. The engine can be reversed from full speed ahead to full speed astern or vice versa in about 12 seconds.

The engine will start without failing under a pressure of 10 kg/cm^2.

It is especially nothworthy that the engine can be run on and switched over to any of the aforementioned fuel oils without necessitating any alterations whatsoever, either to the engine, the load, or the injection pressure.

Throughout the various tests the engine was running faultlessly, the noise being almost nil. All the working parts and bearings were in perfect order.

The test results are very satisfactory in every respect.

JAPANESE SUBMARINES.

Source: Reliable.

9 October 1919.

It has been reported that the number of submarines at present in commission in the Japanese Navy is 27.

Twenty are their own and 7 are captured German submarines, allotted to Japan by the Peace Conference.

Ten are of the Holland type.

No. 19, one of the latest submarines, is due at Yokosuka from Kure at an early date.

It is equipped with two 1,300-h. p. Sulzer (Diesel) engines. It is intended to send them on a trial trip from Yokosuka to Formosa and return submerged.

The Mitsubishi Co. is said to have bought the patents for the engines they are using in their new submarines from England. These are an old type gasoline engine which are now considered useless, and the Japanese Navy has so far refused to accept delivery of submarines fitted with such engines on account of the effect on the morale and the difficulty of running submerged with such delicate engines.

The Mitsubishi Co. is now trying to buy French patents to use steam boilers and coal. These are considered practical in the French Navy.

It is not considered at all probable that Japan will consent to sink her 7 ex-German submarines.

The Japanese Navy intends building 40 submarines during the next three years—to be about 800–900 tons surface displacement.

These 40 submarines are to be built at the Kure, Kawasaki (Kobe) and Mitsubishi (Kobe) shipyards.

It is rumored that they are very desirous of building a submarine of 2,500 tons surface displacement.

They are planning to build some 40 submarines of 1,400 tons surface displacement and 25 knots surface speed. To carry at least two 6-inch guns and six 18-inch torpedo tubes.

Edar Artberg, a German submarine expert who arrived in Japan about two months ago, has recently returned to Tokyo from Kure.

He was brought out to Japan by the Japanese Government especially to train officers and men and to explain the ex-German submarine to the Japanese Navy.

He is said to have been engaged in submarine construction in Germany during the entire period of the war, most of the time at Kiel.

He came to Japan as a Swede.

It is said that the Japanese Navy is also employing a German, who is posing as a Hollander.

Information has been received that there are now building at the Yokosuka naval station 9 submarines, each 8–1,200 h. p., two Diesel engines. The International Steel Corporation has been asked to build 7 more, 1,200 h. p.

There are three Germans employed in submarine construction. Capt. T. Godo, Japanese Navy, is now in Berlin at the head of a commission studying submarine construction with the Germans. He expects to get German submarine patents and to bring German mechanics back with him.

The Japanese have not yet tried out the German submarines, as they do not yet understand the mechanism.

It would appear that the Government is now building six new submarines at the Mitsubishi shipyards in Kobe, and have ordered five more. The first was launched in August, and it is expected to launch one every four months following.

These submarines will have a surface displacement of 900 tons and submerged of 1,200 tons. Their surface speed is 19 knots and submerged 12 knots. They have a cruising radius of 1,300 knots fast speed and 3,000 knots economical speed.

Each submarine to have a 3-inch gun mounted on the bow, to be four torpedo tubes in the bow and one on each side, making six tubes to each boat.

Each submarine to have a 3-inch gun mounted on the bow, to be disappearing, and to be equipped with waterproof fittings.

The Kure shipyard has recently built two 1,000-ton submarines with a submerged displacement of 1,300 tons. It took them six months each to complete. They have four more building at Kure.

The Kawasaki Yard is reported to be building two of large type.

NEW TYPE OF RADIO TRANSMITTING SET.

Source: Bureau of Standards.

6 October 1919.

(9802C.)

One of the principal advances made in radio communication has been the invention and use of a device called the electron tube, otherwise known as the audion, vacuum tube, valve, pliotron, etc. Its appearance is much like an incandescent lamp bulb. It is used to detect radio signals, to magnify or amplify electric currents, and to produce radio waves. It has not been used much for the latter purpose, and the radio messages are usually sent by an apparatus using a spark of some kind. One of the advantages of the spark method was that the rapidly occurring sparks produced a tone that was readily received in the phones of the receiving station. There is no similar ready-made tone that can be heard when the electron tube is used in place of the spark.

The bureau has recently made a study of the above subject and as a result has developed a satisfactory radio transmitting set using an electron tube and including other improvements. Alternating current is supplied to the tube, which gives the signals a musical tone that is even better for receiving purposes than that of the old type of sets using sparks.

The sparkless method of producing radio waves has a number of advantages over the older method. One of the chief points is that

the waves sent out produce much less interference; that is, the wave produces practically no effect in any receiving sets except those that are tuned to that particular wave length. This is quite a step in advance in radio transmission. There are no moving parts in this set; the outfit is perfectly quiet in operation, and no adjustment or attention is required. An automatic key is provided, so that for such purposes as fog signaling, not even an operator is required. In preliminary tests, the set was operated in Washington and signals received in New York. The results were all that had been anticipated, in respect to absence of interference and general satisfactory operation, both at the transmitting and receiving end.

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Number 12—1919

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MONTHLY INFORMATION BULLETIN

15 DECEMBER, 1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

OFFICE OF NAVAL INTELLIGENCE,
NAVY DEPARTMENT,
Washington, D. C., 15 December, 1919.

All commissioned officers desiring to read this publication should be allowed to do so. As it is confidential, due care must be taken to prevent its contents becoming known to unauthorized persons.

The receipt inclosed with the Bulletin should be returned promptly; no transfer or quarterly receipts are required.

Officers are requested to forward for publication in this Bulletin reports on subjects of timely interest and, in particular, material which would be too confidential for general publication. Suggestions and criticisms of this Bulletin are desired from all officers.

A. P. NIBLACK,
Rear Admiral, United States Navy,
Director of Naval Intelligence.

OFFICE OF NAVAL INTELLIGENCE
NAVY DEPARTMENT
Washington, D. C.

MONTHLY INFORMATION BULLETIN

NUMBER 12—1919

15 DECEMBER, 1919

DISTRIBUTION:

In general: Bureaus of the Navy Department; all force commanders; all commanding officers of capital ships, the larger patrols, destroyers, submarines, and Navy transports.

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GOVERNMENT PRINTING OFFICE
1919

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OFFICE OF NAVAL INTELLIGENCE.

MONTHLY INFORMATION BULLETIN.

NUMBER 12—1919—15 December 1919.

FOR CONVENIENCE IN ROUTING.

Officer.	Initials.	Date received.	Date forwarded.
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Executive Officer			
First Lieutenant			
Navigating Officer			
Gunnery Officer			
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First Division Officer			
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Third Division Officer			
Fourth Division Officer			
Fifth Division Officer			
Marine Officer			

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ORDNANCE.

ORDNANCE EQUIPMENT OF THE EX-AUSTRO-HUNGARIAN SHIPS "ZRINYI" AND "RADETZKY."

1. GENERAL DESCRIPTION.

The ex-Austro-Hungarian ships *Zrinyi* and *Radetzky* are battleships of approximately 15,000 tons, built in 1909 and 1910. They are very similar to our *Connecticut* class in design and armament, having a slightly heavier main battery and a lighter secondary battery. They have 12 Yarrow boilers, burning either coal or oil (or both), with 20,054 horsepower triple-expansion engines, designed for a speed of 20 knots.

The ordnance equipment is practically all a product of the Skoda Works at Pilsen and embodies very few new points. Generally speaking, the ordnance gear is greatly inferior to our later ships, although superior to our ships of the same class; i. e., the *Connecticut* class.

The main battery consists of two 30.5-cm. (12-inch) turrets, placed on the center line, one forward and one aft, and four 24-cm (approximately 9½-inch) turrets, two on each side, forward and aft. These waist turrets are at frames 45 and 73, well outboard, in positions exactly similar to our 8-inch turrets, *Connecticut* class. All turrets are two-gun turrets. The length of all turret guns is 45 calibers.

The secondary battery consists of twenty 10-cm. (approximately 4-inch) rapid-fire guns, placed as follows: Eight on each side of the gun deck and two on each side of the main deck, between the forward and after 24-cm. turrets. Each gun is protected by an armored gun shield and is placed in a separate armored casemate. The 10-cm. guns are 50 calibers long.

In addition to the secondary battery there are six 7-cm. (2¾-inch) rapid-fire antiaircraft guns mounted one on each turret. These are 50 calibers in length. Also one 47-mm. (1.85-inch) boat gun, rapid fire, 44 calibers in length, and a number of "Waffen-Fabrik Steyr" machine guns, rifles, and Fegyuergyar pistols.

There are two torpedo rooms on the lower platform deck, one forward at frames 36 to 40, and the other aft, in the stern of the ship. The forward room has two submerged tubes at an angle of 67° on each bow. The after room has one stern tube, firing directly astern (180°), between the two rudders. (NOTE.—The ships are fitted with two rudders, each offset about 6 feet from the keel line on the

quarter.) All tubes are for the 45-cm. (17.71-inch) Whitehead torpedo, and 10 of these torpedoes are carried, 6 forward and 4 aft. Both torpedo rooms are complete with air compressors, air tanks, etc. The forward tubes are 10 feet and the after tube 4½ feet below the normal water line.

There are six fire-control stations, as follows: (1) The chief fire-control station, which is a booth in the forward part of the conning tower; (2) the auxiliary fire-control station in the after conning tower, just forward of the after turret; (3) secondary fire-control station in an armored booth between the main deck secondary battery casemates, on the starboard side; (4) same as (3) on the port side; (5) auxiliary station for main battery in fighting top (not the crow's nest), on foremast; (6) central station, on upper platform deck, directly below conning tower.

Searchlights are placed as follows: Three on platform above upper bridge, two on upper bridge (fitted for signaling), one on each crane, and three on mainmast.

Range-finder stations are as follows: Upper bridge, center line, 1; fighting top, foremast, 2; secondary battery fire-control booths, 2 (one in each, built into booth); after conning tower, 1.

Armor.

The ships are heavily armored in all vital portions with nickel-steel plate from the Skoda Works. Armor thicknesses tally closely with German, British, and United States ships of the same date of construction, but is considerably heavier than in the *Connecticut* class, which is our nearest approach to this class, and which preceded this class by four years in date of construction. The total weight of the armor is 3,219.2 tons. *Connecticut* class weight of armor 3,992 tons—Jane.

The armor plate consists of three varieties, designated as "K," "K. C.," and "Sp. St." (special steel). Type "K. C." has the following percentages of alloys, as a result of a chemical analysis: Chrome, 0.50 per cent; nickel, 3 per cent; phosphorous, 0.08 per cent; silesium, 0.15 per cent; manganese, 0.60 per cent; sulphur, 0.04 per cent; carbon, 0.28 to 0.38 per cent. Type "K" varies from type "K. C." only in the amount of carbon contained. The constituents of type "Sp. St." are unknown.

The lower armor belt (water line) runs entirely around the ship with the exception of a few feet cut off by an athwartships plate at the stern frame No. 118. This belt extends approximately 5 feet above and 5 feet below the normal water line. The central portion (from just forward of the forward 30.5 cm. turret at frame No. 29 to just abaft the after 30.5 cm. turret at frame No. 97) is type "K. C.." 230 mm. (9 inches) thick backed by 80 mm. (3¼ inches) of teak

and 18 mm. ($\frac{11}{16}$ inch) of tin. Forward and abaft of this heavy plate, the armor is of type "K," 100 mm. ($3\frac{15}{16}$ inches) thick backed by 120 mm. ($4\frac{3}{4}$ inches) teak and 15 mm. ($\frac{9}{16}$ inch) of tin. The athwartships plate on the stern is type "K," 100 mm. ($3\frac{15}{16}$ inches) backed by 120 mm. ($4\frac{3}{4}$ inches) of teak and 15 mm. ($\frac{9}{16}$ inch) of tin. The total weight of the lower belt is 1,202.1 tons.

The upper armor belt (directly above the water belt) protects the hull between the berth and gun decks, from the bow aft to frame No. 97. This belt is $7\frac{1}{2}$ feet in height. The forward portion from the bow to frame No. 29 is of light armor, type "K," 10 mm. ($\frac{3}{8}$ inch) backed by 120 mm. ($4\frac{3}{4}$ inches) of teak and 15 mm. ($\frac{9}{16}$ inch) of tin. Between frames 29 and 97 is type "K. C.," 150-mm. ($5\frac{7}{8}$-inch) plate backed by 80 mm. ($3\frac{1}{8}$ inches) of teak and 18 mm. ($\frac{11}{16}$ inch) of tin. The total weight of the upper belt is 354.4 tons.

In addition to these armor belts, the inner wing bottoms are armored (against mines and torpedoes) from the protective deck down to the turn of the bilge, between frames No. 25 and No. 101. This is type "Sp. St.," and consists of two unbacked 27-mm. ($1\frac{1}{16}$-inch) plates, giving a total thickness of 54 mm. ($2\frac{1}{4}$ inches).

The armored athwartships bulkheads at frames 29 and 97 (extending the entire beam of the ship and between the upper platform deck and the berth deck) are both of type "K. C." 150-mm. ($5\frac{7}{8}$-inch) steel, backed by 80 mm. ($3\frac{1}{8}$ inches) of teak and 15 mm. ($\frac{9}{16}$ inch) of tin.

The protective deck follows the upper platform deck from the bow to frame No. 29, where it is stepped up to the berth deck. (The connection between decks is made by the athwartships bulkheads mentioned in the paragraph above.) The level of the berth deck is then followed aft to frame No. 97. This level is maintained only through the midships portion of the berth deck, sloping downward at the sides, forming the deck for the upper coal bunkers to lower edge of the lower (heaviest) armor belt. Abaft of frame No. 97 the upper platform deck is again followed aft to frame No. 118 (the stern athwartships bulkhead). Openings through the protective deck on the berth-deck level are not armored, but are armored on the upper platform deck. There are, however, only three openings on this latter level. The two openings forward (hatches to ice-machine room, anchor engine room, and below) are simply watertight armored hatches. The one opening aft (to the after torpedo room) consists of an armored tube leading up to the level of the gun deck. The protective deck throughout is of type "Sp. St.," with two plates, the lower being 18 mm. ($\frac{11}{16}$ inch) and the upper 30 mm. ($1\frac{3}{16}$ inches) thick, total 48 mm. ($1\frac{7}{8}$ inches) unbacked. The armored tube leading down to the after torpedo room is of type "K," 150 mm. ($5\frac{7}{8}$ inches) thick.

In addition to the protective deck, the decks above it are partially constructed of light armor as follows: That part of the skid deck forming the top of the main-deck gun casemates is composed of two 12 mm. ($\frac{1}{2}$-inch) plates, type "Sp. St.," total thickness 24 mm. (1 inch). The main deck, over the gun-deck casemates, is also composed of two 12 mm. ($\frac{1}{2}$-inch) plates, type "Sp. St." That part of the gun deck between frame No. 29 and No. 97 which lies outside of the portion occupied by the gun casemates is composed of two plates of type "Sp. St.," 14 mm. ($\frac{9}{16}$ inch) thick, total 28 mm. ($1\frac{1}{8}$ inches).

The forward 30.5-cm. (12-inch) turret is armored as follows: The walls of the turret itself are of 250-mm. ($9\frac{7}{8}$-inch) type "K. C.," unbacked armor plate. The front sloping portion (between walls and top) is of 200-mm. ($7\frac{7}{8}$-inch) type "K. C." The side sloping portions (between walls and top) are of 150-mm. ($5\frac{15}{16}$-inch) type "K. C." The top is of 60-mm. ($2\frac{3}{8}$-inch) type "K." That portion of the barbette above the main deck is of 250-mm. ($9\frac{7}{8}$-inch) plate type "K. C." Between the main deck and gun deck that portion of the barbette which lies outside the armor around the gun-deck gun casemates is of 240-mm. ($9\frac{7}{16}$-inch) type "K. C." plate, while that portion (the section from about 135° to 225°) lying inside this armor is of 100-mm. ($3\frac{15}{16}$-inch) type "K" plate. The corresponding sectors of the barbette between the gun deck and berth deck are of 100-mm. ($3\frac{15}{16}$-inch) and 80-mm. ($3\frac{1}{8}$-inch) type "K" plate, respectively. Below the berth deck the turrets are unarmored. All turret armor is unbacked.

The after turret (30.5—12-inch) is armored in the same manner as the forward, with the following exceptions: Since no portion of the barbette is inclosed in the gun casemate armor, heavier plate is used on the forward sector (approximately 315° to 45°) of the barbette between the main and gun deck. This is of 200-mm. ($7\frac{7}{8}$-inch) type "K. C."

The 24-cm. ($9\frac{1}{2}$-inch) turrets and barbettes are all armored alike. The turret walls are of 200-mm. ($7\frac{7}{8}$-inch) type "K. C." The front slope is of 160-mm. ($6\frac{5}{16}$-inch) and the side slopes of 125-mm. ($4\frac{15}{16}$-inch) type "K. C." plate. The tops of the turrets are of 50-mm. (2-inch) type "K." The portion of the barbette above the main deck is of 200-mm. ($7\frac{7}{8}$-inch) type "K. C." plate, with the exception of the most unexposed quadrant (No. 1 turret 180° to 270°; No. 2 turret 90° to 180°; No. 3 turret 270° to 360°; No. 4 turret 0° to 90°), which is of 180-mm. ($7\frac{1}{16}$-inch) type "K. C." Between the main deck and the gun deck the outboard half of the barbette is of 100-mm. ($3\frac{15}{16}$-inch) type "K" armor. This portion of the barbette is already protected by the 120-mm. ($4\frac{3}{4}$-inch) armor around the gun casemates. Between the gun and berth decks the outboard half of the barbette is of 50-mm. (2-inch) type "Sp. St." The turrets are unarmored below the berth deck.

The main deck gun casemates (4) are protected by 120-mm. ($4\frac{3}{4}$-inch) type "K. C." armor outboard between the main and skid decks. The athwartships bulkheads at either end of these casemates are of 100-mm. ($3\frac{15}{16}$-inch) type "K" plate. These casemates are also armored inboard with 100-mm. ($3\frac{15}{16}$-inch) type "K" armor.

The gun deck gun casemates (16) are all inclosed in one armored structure extending completely around the gun deck, between frames No. 36 and No. 85. This structure, both the outboard armor and the athwartships armor, is of 120-mm. ($4\frac{3}{4}$-inch) type "K. C." Inside of this the separate gun casemates are inclosed by 25-mm. (1-inch) type "Sp. St." athwartships bulkheads and 15-mm. ($\frac{9}{16}$-inch) type "Sp. St." fore and aft bulkheads. All armor on gun casemates is unbacked.

The forward conning tower (which extends down to central station on the upper platform deck) is armored down to the berth deck. The top of the upper compartment (the conning tower proper) is of 60-mm. ($2\frac{3}{8}$-inch) type "Sp. St.". The walls of this upper part (above the level on the skid deck) are of 250-mm. ($9\frac{7}{8}$-inch) type "K. C.". Inside these walls the fire-control booth is separated from the main part of the tower by a 30-mm. ($1\frac{3}{16}$-inch) type "Sp. St." bulkhead. Between the skid deck and main deck the three forward quadrants (225° to 135°) of the conning tower are 240-mm. ($9\frac{7}{16}$-inch) type "K. C.", and the after quadrant (135° to 225°) 200-mm. ($7\frac{7}{8}$-inch) type "K. C.". This after quadrant in this case is additionally protected by the armor around the battle-signal station just aft of the conning tower. This armor is 120-mm. ($4\frac{3}{4}$-inch) type "K. C.". Between the main deck and the gun deck the forward quadrants are armored with 140-mm. ($5\frac{1}{2}$-inch) type "K. C." and the after quadrant with 120-mm. ($4\frac{3}{4}$-inch) type "K. C.". Between the gun deck and the berth deck the forward three quadrants are of 100-mm. ($3\frac{15}{16}$-inch) type "K", and the after quadrant of 80-mm. ($3\frac{1}{8}$-inch) type "K". The conning-tower armor is not backed.

The after conning tower also extends down to the berth deck, but is armored only down to the main deck. The top of the conning tower is of 40-mm. ($1\frac{9}{16}$-inch) type "Sp. St.", and the walls down to the main deck of 120-mm. ($4\frac{3}{4}$-inch) type "K. C." plate.

The upper part of the secondary battery fire control booths which project above the skid deck (between the main deck gun casemates) are specially armored with 40-mm. ($1\frac{9}{16}$-inch) type "Sp. St.", and the range finders contained in these booths with 30-mm. ($1\frac{3}{16}$-inch) type "K." The tops of these booths are of 10-mm. ($\frac{3}{8}$-inch) type "Sp. St." Between the skid deck and main deck these booths are separated from the gun casemates by 25-mm. (1-inch) type "Sp. St." bulkheads.

All doors or hatches through armor plate are armored to the same thickness, excepting the case of hatches through the protective deck on the berth deck level. These are partially protected by armored hatch coamings extending about 1 foot above the deck, and by battle bars with only a small opening (large enough for one man to pass through).

THE "ZRINYI."

30.5 CM. TURRETS.

General Description.

There are two of these turrets, one situated forward and one aft on the center line similar to our *Connecticut* class. Each turret contains two 30.5-cm. (approximately 12-inch) 45-caliber breech-loading rifles. All guns are fitted to fire semifixed ammunition only.

The turret itself (the turning part) extends down to the pivot which is secured to the keel. There are five decks or platforms from the keel up to and including the gun platform. For convenience in describing, these will be referred to, from the bottom up, as (1) handling room, (2) lower-circle deck, (3) upper-circle deck, (4) reloading station, (5) loading or gun platform.

The handling room opens (by water-tight door) on one side to the magazine and on the other to the shell room. It contains trolleys, shell turntable, and the lower end of both main and both auxiliary hoists. The lower circle deck has on it the auxiliary hoist motor and drums, and the hand gear for them, and the elevating motor generators. The upper circle deck contains the main hoist motors and drums, with their hand gear, and the necessary gear and indicators for training by hand. Above head on this deck is the training rack and pinion, the pinion being driven by a shaft extending down from the next deck. The reloading station contains racks containing a dozen complete charges (shells and cartridge cases) with the necessary gear for placing them in the hoists. The training motor is on this deck, also the hoist controls (main and auxiliary), ventilating motor, and air tanks (for recoil cylinders). Both the main and auxiliary hoists have openings on this level for the loading of the "stand by" ammunition in the racks. The gun platform contains the guns, with their appurtenances the upper ends of the main and auxiliary hoists; loading wagon and track for the main hoist; loading car with trolley for auxiliary hoist; training gear (power control and annunciators for hand train); elevating gear (elevating motor and control and hand elevating gear); hand-operated rammer; stand-by shell rack (nine rounds); turrett officer's control station. On top of the turret is mounted a 7-cm. (approximately $2\frac{3}{4}$-inch) antiaircraft gun and

to the sides of the turret (on the *Radetzky* only) are affixed ammunition boxes, containing ready ammunition for this gun.

The turret can be entered (1) from either the magazine or the shell room, (2) from the power-distribution rooms, which are on a level with the lower circle deck (the ship's upper platform deck), or (3) through the top of the turret via an armored hatch. There are also two slanting openings in the floor of the gun platform in the overhang of the turret, which may be used for entrance or egress, but which are primarily intended for the ejection of empty cartridge cases.

The turret rests on spherical steel rollers (approximately 4¾ inches in diameter), which ride between roller paths of heavy nickel steel. The upper roller path is, of course, secured to the turret, and the lower to a heavy reinforced steel structure, which is secured to the gun deck. The roller paths can be gotten at from the space between the turret and barbette, which is entered from the reloading station of the turret, through a small manhole.

The turret and barbette armor has been previously described.

Gun, Mounts, and Recoil System.

The guns are 30.5-cm. (12-inch), 45-caliber breech loading rifles, made by the Skoda Works in 1910, weight 54,650 kilograms (60 tons, approximately).

Very little can be learned about the construction of the guns, as the blue prints are very incomplete on this subject, and but little could be learned by inspection. It is believed, however, that they are "shrunk-on" guns, consisting of an inner tube and liner, with one shrunk-on chase hoop and two shrunk-on jacket hoops, with a shrunk-on collar just forward of the breech, to which the recoil pistons are secured. It is bell-mouthed, rifled, and somewhat similar to our 12-inch Mark V. A square hole is cut horizontally through the breech end, to receive the sliding breech mechanism. The outer jacket hoop has lugs on top and bottom which fit into grooves in the slide.

The guns fire an A. P. projectile (capped) of variable weight, according to their form, using a cartridge-case charge weighing 138 kilograms (304 pounds). The maximum range is 17,000 meters (18,600 yards).

The powder chamber, compression slope, and seat of rifling are very similar to our guns. The rifling is of plain section and is believed to be of uniform twist, and has about two turns.

The gun works in a heavy slide, extending from the collar at the breech end up to almost the face of the turret. This slide has attached to it the trunnions, and the recoil cylinders form the lower bearing of the slide; under the recoil cylinders are secured the elevating arcs, two to each gun.

The mount, containing the trunnion seat, is built up of heavy angle iron and plating and secured firmly to the turret deck. It is so constructed that the weight of the gun is distributed over a large area. The mount is very simply and strongly built.

A somewhat novel arrangement is the method of adjusting knife edges and clearances in the trunnion bearing.

The main trunnion seats in the mount, and is held in position by the usual capsquare. Extending from the main trunnion (a little above the center) is the adjusting trunnion corresponding to our knife edges. This takes the weight of the gun except on recoil. This adjusting trunnion rests in a bearing, which can be raised or lowered by a screw arrangement. Coming up on the nut and screw acts through a ball race and spring washer to raise the trunnion seat. The screw is secured in position by two set screws at the slide.

The recoil system consists of three cylinders, placed under the gun, the outer cylinders containing glycerin, and the inner, compressed air. The pistons in the outer cylinders travel aft as the gun recoils, carrying the glycerin with them and forcing it into the central cylinder. Here the glycerin forces the piston forward and further compresses the air already in the cylinder. When the force of recoil is expended the compressed air in the middle cylinder returns the gun to battery. The constructed opening in the outer cylinders, around the piston stem, acts to throttle down both recoil and counterrecoil.

The middle cylinder is charged to 40 atmospheres from the air flasks in the reloading station, which, in turn, are direct connected to the forward and after air compressors. An air gauge is placed on the forward end of the air cylinder and an air and glycerin relief valve on the after end.

At the limit of recoil the pressure in the middle cylinder reaches about 120 atmospheres.

The maximum recoil is 32 inches.

Breech Mechanism and Gun Firing.

The breech mechanism installed in these turrets is believed to be one of the best features of the entire ordnance installation. It is very simple and efficacious for a cartridge-case gun, and in spite of its massive construction and great weight is handled with extreme ease, working so smoothly that one twist of the handle gives sufficient momentum to completely open or close the breech; time, between one and two seconds. Two and one-eighth turns, only, are required to completely open or close the breech.

The plug is of heavy, solid, machined steel, and has four cylindrical rollers on both top and bottom (total of eight) which work between horizontal grooves both in the plug and in the gun, making for easy handling.

The main action of the plug is very simple. Rotating the handle (or crank) on the side rotates a gear wheel inside the plug. This gear wheel meshes into two other gear wheels inside. The upper of these is on the outer end of a shaft, the inner end of which carries a heavy, three-thread spiral worm. This worm projects above the plug, and works in a female part which is cut into the gun. The lower gear operates a lock. This is in the form of a cam on the gear shaft. Turning the shaft throws the cam down into a slot in the lower part of the gun, thus holding the plug in place and taking the stress when the gun is fired. When the plug is withdrawn this cam turns upward and disengages. By the time the cam again reaches a down position (while opening the breech) it is clear of the gun and can go down freely.

In one handle of the crank is a plunger. This is held out by the action of a light spring, and while so held out, a small lug is forced into a hole in the gun, acting as an additional lock, and completing the firing connection (electric). In closing the breech, the spring forces this lug into the hole in the gun only when the breech is completely closed. To open the breech the plunger must be pressed in to disengage the lock and break the firing connection. Thus the firing connection is not made until the breech is clear home, and it must be broken before the breech can be opened. This same plunger extends through to the other handle of the crank and serves to set the electric firing circuit on "safety," as will be described later. A further safety for electric fire is a second break in the firing circuit inside the plug. One contact point is on the gun and the other on the plug, and contact between the two is not made until the breech is completely closed.

A second safety for percussion firing consists of an arm on the sear, the sear being in the form of a bell crank. This short, horizontal arm comes opposite an opening in the collar around the main crank, only when the plug is clear home. Until the hole is opposite the arm of the sear, the sear can not be tripped, due to the fact that the arm will come up against the collar, where it must seat in the hollow to allow the sear the motion necessary to trip the firing pin.

There are separate firing pins for electric and percussion firing. The electric firing pin is permanently housed in the plug in such a position as to come into contact with the primer when the breech is completely closed. It is simply an insulated contact point.

The percussion firing pin is more complex, and yet is comparatively simple, though somewhat difficult to describe. It is inserted easily from the breech, and firing pins may be changed in approximately five seconds. The firing point is semiconical in form, thus allowing room for the electric firing pin. The after portion is fixed in position in the breech, while the forward portion forms a sleeve,

inclosing the firing spring, this sleeve is slotted to fit over the after portion, and is movable upon it. The after (fixed) portion rests in a bearing, or "rocker," which is operated by the sear, as described later. Forward of the sleeve the firing pin is cut half in section, forming a face upon which the cocking rod acts in cocking the gun.

The operation of cocking and firing is as follows: The cocking rod has attached to its outer end (on the side of the plug) a bell crank. The short arm of this crank rides on the cam collar attached to the main operating shaft. When the plug is being closed this cam forces the arm of the bell crank up and forward. This turns the cocking rod, and puts tension on the spring around the cocking rod. This spring is secured to the fixed bushing at one end and to the rod at the other. The inner end of the cocking rod forms another cam, which, when turned, bears against the face of the firing pin sleeve and forces the sleeve aft, compressing the firing spring. When forced aft, a lug at the forward end of the "rocker" engages a collar on the sleeve and holds it in this position. The gun is now cocked. The tension on the spring around the cocking rod brings the cocking rod back to its original position, thus allowing the firing pin to fly forward when released.

When the firing lever in the pointer's hood is pulled aft, the motion is transmitted through a series of rods and bell cranks to the sear, which is also forced aft, if the small arm of the bell crank is opposite its hole in the cam collar on the main operating shaft. This motion is transmitted through a shaft to the "rocker," rocking the forward end down and lowering the lug until it disengages the collar of the firing pin. This allows the firing pin to fly forward and strike the primer. In case of a misfire, the firing pin may be recocked by hand, by pulling back the long arm of the bell crank on the outer end of the cocking rod.

When the gun is completely loaded, and the plug closed, both firing circuits may be set on "safety" by means of a lever on the side of the plug. The action of this is as follows: When the lever is up on "fever" (fire) the gun is ready to fire, as described above. But when the lever is thrown down to the "sicher" (safety) position, both percussion and electric firing are effectively locked. The percussion is locked by means of a lug which is turned into a slot in the sear shaft, thus preventing rotation of this shaft, and hence preventing releasing the firing pin. The electric firing circuit is broken by means of a small cam (on the shaft of the safety lever), which engages the end of the plunger rod (which has been mentioned before as extending through to the other crank handle) and forces it aft, thus breaking the circuit which is completed through the plunger rod.

Both percussion and electric firing keys are very poorly rigged. A lever having considerable play is used to trip the sear. This is not in a handy position for the pointer, and necessitates considerable reach and then a pull of about 10 inches. The electric firing key consists of a brass plate, set inside the elevating wheel. This must be pressed down by the thumbs on both sides to complete the circuit.

The cartridge-case ejector consists of two sets of heavy steel claws. Each set has top and bottom arms. The right set grips the shell, and the left set grips the right set. The left set is mounted on a vertical shaft, having a slotted horizontal arm. A lug on the plug works in this slot and, when the plug is started open, slightly turns the shaft, throwing the claw arms aft. These bear upon the claws of the right set and start the case off its seat, giving the initial force to break the case free. The right set is also mounted on a vertical shaft, and have, at right angles to the claw arms, a short arm, forming a bell crank. When the plug is opened rapidly, just as it comes to the end of its travel, it strikes this short arm and throws the right claw arms aft with considerable force. This throws the case clear of the breech.

Elevating Gear.

The elevating system is antiquated and, except for the hand gear, has no novel features. A motor generator, speed 1,800 revolutions per minute (on the lower circle deck), receives direct current at 100 volts from the turret mains, and steps it up 440 volts for the elevating motor. This is a direct-current shunt interpole motor, speed 1,800 revolutions per minute, and is placed just below the deck of the pointer's hood. The speed of elevating or depressing is varied by varying the field of the motor through the pointer's elevating wheel, the Ward-Leonard system, which needs no description.

A fine speed control is, however, obtainable, the principal defect being the time lost in shifting direction (from elevating to depressing, or vice versa), it being impossible to follow up exactly, due to mechanical defects and irremediable lost motion. At full speed it takes nine seconds to elevate or depress 20°, while the slowest speed obtainable for 20° is six minutes five seconds.

The motor shaft is conected to the elevating pinion shaft through gears, a worm, and a clutch. A heavy machined elevating arc is attached to the gun slide, and the gun is elevated by means of this arc and pinion. This is perhaps superior to our elevating screw system, as it is always accessible, and is easily cared for. Each gun has two arcs and two pinions (one on each side). The two guns of a turret are not interconnected.

A mechanical locking system is installed which makes the elevating system practically foolproof. This consists of a locking lever,

which has two positions, "load" and "ready," and which is mechanically connected to the locking rods. With the lever on "ready" the gun may be elevated or depressed readily, but the rammer is locked in its housed position and the ammunition wagon is locked in front of the main hoist to prevent its being placed in the line of recoil. Once the lever is on "ready," it can not be thrown over to "load" until the gun is placed between 2° and 3° elevation and stopped, the loading position being 2½° elevation. When this is done and the lever is thrown over to "load," the ammunition wagon and rammer are released, and the elevating gear is locked, preventing any motion of the gun until the lever is again thrown over to "ready."

In this connection another noticeable defect might be mentioned here. This is the difficulty which the pointer necessarily has in placing the gun on loading position. There is no position indicator before him, the only one being the arc behind him, which can not be read from his position. This necessitates the services of another man (probably the one stationed at the locking lever or the man at the hand-elevating gear) to coach him on. This is a slow and unwieldy method, to say the least, when an indicator could easily be placed before him. Blue prints and drawings lead me to believe that at one time an electric indicator was planned or installed for this purpose, but none are now in place.

The elevating arc is fitted with both electrical and automatic limit stops, which slow down the speed of elevating (or depressing) as the limit (20° elevation and 4° depression) is neared. The electrical contrivance is simply a mechanically controlled rheostat (working off a gear on the elevating pinion), which throws in sufficient resistance at 18° or 2° to gradually slow down the speed and finally stop the motor when the limit is reached, so that the gun comes to an easy halt. The mechanical stop also works off a gear on the elevating arc through gears, cranks, and levers, so that at the limit of elevation (or depression) the elevating wheel (power) is forced back to the central or "stop" position.

The hand-elevating gear is noticeable, as in the case with all the hand gear aboard, for its easy working. One man can operate it with considerable speed very easily, elevating 10° in 10 seconds. The gearing is simple, connecting to the same worm, pinion shaft, and pinion as the electric drive through a clutch.

The hand gear is thrown in by throwing over a lever at the pointer's feet. This throws over the clutch from electric to hand, and an attached arm throws in a locking lever which locks the pointer's elevating wheel and prevents its turning. The man operating the hand gear is not, of course, in a position to use the pointer's telescope, so must be coached on by the pointer. It is believed that the high efficiency obtained in the hand gear is due to high-grade

machine work in all gearing and to the insertion of ball bearings wherever possible.

As actually mounted, the pointer's elevating wheel (power) is placed athwartships instead of fore and aft, and is somewhat higher. The pointer sits on a high stool, and has a comfortable position, except that the percussion firing lever is placed too far from him, requiring a stretch to reach. The telescope has a blind eyepiece (adjustable) for the left eye. The eyepieces are not fitted with guards or buffers, an elastic headrest serving to keep the eye centered in position.

Training Gear.

The Ward-Leonard system is also used for training and is so arranged that a wide variety of speeds is obtained. For electric training there are three speed combinations: (*a*) Full, (*b*) normal, (*c*) slow. When hooked up for full speed a high speed of training, 90° in 25 seconds, is obtained, while the slowest speed obtainable with this hook up is 90° in 4 minutes 30 seconds. When the lever is on "normal speed" the fastest speed for 90° is 1 minute 7 seconds, and the slowest for 90° is 4 minutes 30 seconds. When geared up for "slow" the highest speed obtainable for 90° of train is 1 hour 3 minutes 30 seconds, and the slowest is 2 hours. Using the hand gear one man can train the turret 10° a minute without undue exertion and four men can train it 10° in 36 seconds.

The training motor is situated in the reloading station and is a direct current, shunt, interpole, 100-volt, 1,000-revolutions-per-minute motor. This receives current from a motor generator in the dynamo room, of which the motor is direct current 100 volts, and the generator direct current 3.8–110 volts, 1,000 revolutions per minute. The armature of this generator is permanently connected across the armature of the training motor. The field of the generator and of the training motor is fed from 100-volt mains, through the control rheostat.

The training motor shaft is connected through gearing and a clutch to the training pinion shaft. The system between the training motor and the training pinion is practically identical with the system between the elevating motor and pinion, and hence needs no further description.

In the trainer's hood are three levers, the uses of which are as follaws: The lower lever has two positions, "electric drive" and "hand drive." Shifting this lever from one to the other does not shift the main clutch from electric to hand but simply changes the connections of the trainer's wheel, so that instead of varying the field of the motor when the wheel is turned an annunciator shows the hand-training station, which direction to train, and the speed of train desired. A second lever is on the training-wheel shaft and has two

positions—the down position being "electric fast" and the up position being "electric slow," or "hand drive." This lever operates the main clutch (beside the motor) and partially makes the shift of gears from electric to hand or vice versa. (Another lever on the upper-circle deck must be thrown over to "hand" to make the shift complete. With the latter lever on "hand" and the top-side lever up, the hand connections are complete. With the circle-deck lever on "electric" and the top-side lever up, the turret is geared for slow-speed electric training.) A third lever in the trainer's hood, at the left side of the trainer's wheel, is used to make the shift from normal to full speed and has two positions, "normal" and "full." This lever is simply local in effect and does not change the gearing in any way, and does not actually affect the speed. What it does is this: When thrown over to "normal" it throws a locking lug into the training wheel, which prevents its being turned far enough to bring the motor up to full speed. When on "full" this lug is disengaged and the wheel may be thrown over to its extreme position.

On the upper circle deck, at the hand-training station, are two more lever-operated clutches. The upper of these is the one mentioned in the above paragraph which must be thrown from "electric" to "hand" to complete the connections for hand train by throwing in the gear to the hand-training crank. This lever also breaks the electrical training circuit when thrown to hand. The lower clutch lever has two positions, and is used only for hand train. These positions are "hand slow" and "hand fast." Shifting the clutch simply changes the ratio of the gears.

The complex system of gearing for "hand train," and more particularly for "slow electric," is very difficult to put into words. It may be more readily understood, however, by the statement that all clutches are keyed to and revolve with their respective shafts, while all gears ride free on their shafts when not clutched in.

The training system is fitted with both mechanical and electric limit stops. The electric stop is driven through a system of gearing leading off the main pinion shaft. This operates a rider on a screw in a contact case, which, as the turret nears either limit of train, makes the necessary contacts to slow down the motor and finally to stop it entirely. This same rider makes the contacts for the "Danger arc signal system" for the other turrets. The mechanical limit stop consists of a bell crank lever mechanically connected to the hand training wheel. The lever itself is in the space between turret and barbette and turns with the turret. As the turret nears its limit of train, the lower arm of the lever takes up against a sloping track which is secured to the barbette.

As it moves up this slope this arm is forced up and the lever is turned, this turning (through its gearing) the trainer's handwheel

back to the central or stopped position. At the limit of train a spring buffer on the turret comes against a spring buffer on the barbette, cushioning the blow.

In addition to the magnetic brake on the training motor there is a friction brake on the main pinion shaft.

The pinion shaft extends up to the deck above the reloading station and ends in a bearing in the deck. From the end of the shaft a small gear wheel operates mechanically the training indicator in the trainer's hood, indicating the relative position of the turret to the ship at any time.

Rammer Gear and Ammunition Wagon.

The rammer and ammunition wagon are operated by the same crank and the same operator, and are both hand operated only—no electric operation. The entire gear is strongly constructed and is easily handled. Only one, either the rammer or the wagon, can be operated at a time.

Taking the rammer first, the operation is as follows: Throw the clutch in by throwing the clutch lever (on the after end of the rammer casing) over to the "rammer" position. Now, by turning the crank, motion is transmitted through a set of gearing off a lower shaft to a gear which meshes with a sectional rack. One end of this sectional rack is secured to the forward end (rammer head) of the telescopic rammer and forces it forward. When the inner section of the rammer is run out it engages by means of a collar the next section outside of it and forces it out, and in this way the entire rammer is run out. The rammer is in five telescopic sections, one housing within the other. The rammer is withdrawn in a similar manner by reversing the direction of turning the crank. When the rammer is completely withdrawn the sectional rack is housed in a 4-inch pipe which runs around the turret wall. The sharp turn is accomplished around a hexagonal wheel, whose sides are the same length as one section of the rack. Four turns of the crank are necessary to run the rammer in or out.

To operate the wagon, throw the clutch-operating lever over to "wagon." This disengages the rammer and engages the wagon drive. When the crank is now turned the sprocket gear on the end of the lower shaft is revolved and drives (chain drive) a lower sprocket wheel on a worm shaft. Through this worm and another gear, a large sprocket wheel under the flooring is driven, and the chain around it is connected to the wagon, pulling it in the direction desired. Four and one-half turns of the crank are necessary to bring the wagon from the hoist to the gun or vice versa.

The ammunition wagon itself is a fairly complicated piece of mechanism. Each gun has its own wagon, although in case of a

mishap to one side of the main hoist or to one wagon, one wagon may be used for both hoists and both guns. The wagon rides on a track extending across the turret behind the guns and built into the loading platform, and is propelled as described in the above paragraph. The track is fitted with pivoted lugs, which when thrown into place automatically stop the wagon in exact position behind the hoists and behind the gun. Beside the track is a safety lever. This is pressed down by the wagon when it leaves the breech of the gun, but is released when the wagon is at the breech. When released it is impossible to fire the gun either electrically or by percussion, for the electric-firing circuit is completed through this lever and a contact under it, and a locking lug is thrown into the percussion firing circuit by mechanical means operated upon the releasing of the lever. However, as soon as the wagon leaves the breech, and forces down the lever, the electric contact is again made, and the percussion locking lug is disengaged.

The wagon has an upper and a lower tray. The lower tray carries the shell and the upper the cartridge cases, and the two trays are placed at a vertical distance apart equal to the distance between the similar trays in the main hoist. With the wagon in front of the main hoist the shell and cartridge case are rammed out of the hoist on to the wagon by hand rammers operated through openings in the forward side of the hoist casing (the space between the hoist and the trainer's hood). Both trays are fitted with rollers to facilitate the handling of ammunition on them.

When the loaded wagon is brought astern of the breech the clutch is shifted to "rammer" and the shell rammed first and the rammer withdrawn. The "releasing lever" which is secured to the rammer-gear casing is then thrown down. This operates through a system of rods and levers to release a lug which holds the upper tray up in position. When released, the upper tray operated by the weight of the cartridge case, folds down on the lower tray, against the action of a heavy spring under the forward part of the lower tray. When completely folded down another locking lug is thrown in and locks it in this position. The cartridge case is now in position for ramming. After the cartridge case has been rammed and the wagon is empty, the upper tray stays locked down until the car is started back toward the hoist. The locking lug then takes up against a cam secured to the floor plates, and is disengaged thereby, and the heavy spring aforementioned forces the upper tray back up to its original position.

Another interlocking device (mechanical) is installed to prevent operating either the rammer or the wagon except when the gun is on loading position. This was described under the head of elevating gear.

Still another mechanical locking system operates between the track and the lower tray. This consists of a stop which holds the shell in position in the tray except when the wagon is at the main hoist or at the gun. At these positions the lug (by means of a roller and cam on the track) is dropped to allow of loading or unloading the wagon.

The lower tray has a light detachable side tray beside it for empties.

Main Hoist.

Each turret is provided with two separately operated main hoists, which run side by side in an inclined shaft in the center of the turret, extending from the handling room up to the top of the turret. These hoists may be driven either by motor or by hand, are well constructed with numerous safety devices, and give excellent service. At full speed a loaded car may be hoisted in nine seconds.

The hoist motor receives current from a motor generator set outside the turret at a voltage of 3 to 110 volts. The motor generator is a direct-current, 1,180 revolutions per minute, 100-volt interpole machine and the hoist motor is a shunt interpole, direct-current, 100-volt, 270A, 1,000-revolutions-per-minute machine. Its speed is varied by the Ward-Leonard system of control, operated through a rheostat from the control wheel in the reloading station. A cable and hoist drum similar to ours is used and is located on the upper circle deck.

A simple clutch throws out the electric connections and hooks up the hand gear by a single operation of throwing over the clutch lever on the upper circle deck. A second lever and clutch governs the speed of hand hoisting by changing the ratio of the gears. To the main clutch ("hand" and "electric") is attached a double safety similar to that on the training gear. First, a mechanical arrangement is actuated when the clutch is thrown to "hand," which locks the electric-control wheel in center (stopped) position. Second, the electric circuit is broken when the lever is thrown to hand, which, of course, makes impossible the operation of the hoist motor. Directions for operating the hoist by hand are given through a voice tube connecting with turret and the handling room.

A car-position indicator, driven through gearing off the hoist drum, is at this station and indicates the position of the car in the hoist at any instant. This also connects with and operates a position indicator at the control station.

The hoist drum is fitted with a friction brake in case of accident. This is inside the drum around the shaft. In addition to this the motor is fitted with a magnetic brake.

The hoist car has a lower tray for the projectile and an upper one for the powder. The car fits snugly into the hoist shaft, and has

numerous rollers bearing against tracks inside the shaft, which reduces the friction in hoisting. The entire weight of the car is taken by the hoist cable, which runs on rollers under the waist of the car. Should the hoist cable carry away, the weight of the car forces together two metal grips or clamps, which grip the central track inside the hoist and keep the car from falling.

The after end of both upper and lower trays have stops to stop the shell (or cartridge case) when it reaches this position and to hold it in place. On the shell tray this stop takes the form of a leather buffer, while for the cartridge case it is simply a metal shoulder. They are both operated by the same arm. A spring holds these stops up in position except at the top and bottom of the hoist, when a lug in the hoist strikes a projecting lever on the bottom of the spring, forcing the spring down, and allowing the stop arm and stops to drop. Another spring-operated lever operates a stop which holds the nose of the projectile in place until released by the action of the lug (in the hoist) on the lever. This action takes place at the handling room, reloading station, and top of hoist.

The control station for the main hoist is in the reloading station. Turning the handwheel operates through gears to the starting box on the lower circle deck, varying the resistance, and hence the speed of the motor. A lever at the side can be thrown to "normal" or "full" speed in the same manner as described for the training wheel by preventing the wheel being thrown hard over when this lever is on "normal." Outside and around the handwheel is a geared wheel geared to the hoist drum. Attached to and revolving with this large geared wheel is a pointer, which indicates on a stationary dial the position of the car in the hoist at any instant. Above and on either side are small dials indicating (1) when the car has been loaded in the handling room and is ready to hoist; (2) when the car has been unloaded on the gun platform and is ready to lower. These are both operated mechanically from the stations named and are mechanically locked with the control gearing, so that the control wheel can not be moved until they have been thrown to the "ready" ("fertig") position.

The car can be stopped while being lowered at the reloading station by throwing over a lever which operates a stop inside the hoist. This is the lever to the left of the control wheel. This will not, however, stop the car at the reloading station when being hoisted, it being necessary to hoist the car a little above the reloading station and then lower it.

When being stopped at any one of the three stations the car is brought to a gradual halt. This is done by means of short curved arms projecting into the hoist, three to each station. These are mounted on the same shaft as a pinion which meshes into a rack cut

into the control rods from the handwheel to the starting box. As the car approaches the station at which it is desired to stop it strikes one after another of these arms. Each arm as it is struck is thrown up (or down, as the case may be) and through the pinion and rack aforementioned throws the hand control wheel back toward the center, thereby cutting down the speed. The last arm completely stops the car. Both top and bottom of the hoist are fitted with buffers.

When the car reaches the top of the hoist another lug is hit which throws down the arms holding the hoist doors open; this also connects to the small dial above and to the left of the control wheel in the reloading station, throwing the pointer to "open" ("gesperrt") automatically. After the ammunition has been run out of the car onto the wagon, the rammer man, forward of the hoist, closes the forward doors which in turn closes the after doors, and throws the indicator to "ready." A similar action takes place at the bottom of the hoist. When the car reaches the bottom a lug is struck, which throws a lever in the handling room over to "loading" ("beladen") and simultaneously one in the reloading station, above and to the right of the control wheel, to "open," locking the control wheel as described above. When the car is loaded, an operator throws the handling room lever over to "ready," thus unlocking the wheel and throwing the control station dial to "ready." This is the signal to hoist.

Auxiliary Hoist.

Each turret has two auxiliary hoists in addition to the two main hoists. These operate satisfactorily, both by motor and by hand, and under full power a load may be brought up in eight seconds. But they are really unnecessary, as the occasion would seldom arise when both main hoists would be out of order for both power and hand. Since two trips are required to bring up a complete load on the auxiliary hoist (only one piece, either shell or cartridge, case being carried at a time) the hand gear on the main hoist would prove quicker and more reliable. The auxiliary hoists take up a great deal of room in the turret and hinder moving about, both in the turret and in the handling room. Furthermore, they have such a great deal of gear attached to them that they make a troublesome installation, the removal of which would greatly simplify and improve the entire turret.

Unlike the main hoist, each auxiliary hoist car rides up and down in an inclined cylindrical casing. Only one piece, either shell or cartridge case, can be hoisted at one time and comes up in a vertical position. The hoist shaft or casing is broken in four places—two in the handling room, one in the reloading station, and one at the top of the hoist. These broken sections are pivoted in the middle and may

be turned to a horizontal position for loading or unloading the hoist. Of the two sections in the handling room the lower is for shell, being loaded direct from the turntable, and the upper for powder, coming in slings on the overhead trolley. In the reloading station this pivoted section turns into a position for loading from the reloading table. On the gun platform the pivoted section, which forms the top of the hoist casing, turns into a position to unload the shell (or cartridge case) onto a conveyor which runs on an overhead trolley. This conveyor, when loaded, is run to a position between the breech and the rammer, and the load rammed into the gun.

The motor generator and motor, the shifting gear from motor to hand and vice versa, the hand drive, the control gearing, the locking and safety devices on the auxiliary hoist are practically identical with those on the main hoist and need no further description.

Handling Room.

The shell room opens into the handling room from forward and the magazine from aft. There are two entrances to the shell room, one on each side of the ship. None of these openings have any flame-proof protective features.

Around the outer edge of the handling room and inclosing the main and auxiliary hoists is the turntable. This has racks for 30 shells placed in a vertical (nose down) position. The entire turntable is on rollers on a circular track. The lower inner edge of the turntable is geared throughout the complete circumference and is driven (revolved) by a pinion through a set of gears and chain belts to a hand-operated crank, which is secured to the side of the main hoist. The turntable, completely loaded, is easily revolved by one man. At the operator's station is a foot lever which, when held down, allows the turntable to rotate freely but which, when released, throws in a lug which stops the turntable when the next shell comes into position for loading.

Each shell rack on the turntable is separate and is pivoted, and when loaded is so balanced that one man can easily throw it up into a horizontal position. When thrown up hard, the shell unseats itself from the shell rack and starts forward onto the loading tray which is secured to the main hoist. Here it comes upon rollers (mounted in the tray) so that it is easily shoved home into the hoist. When the shell rack is brought up to the horizontal position, a lug engages it, holding it horizontal, until the shell is loaded into the hoist, when the lug is disengaged by a hand lever and the shell rack resumes its vertical position.

The cartridge cases are handled at the opposite side of the main hoist. They are transported from the magazines in broad woven slings, on a differential pulley, which throws on an overhead track.

The plates show a metal car or carrier suspended from the track, for carrying the cartridges, but these had all been removed for some cause and the slings substituted. From the sling the case is transferred to a sloping tray attached to the main hoist, and comes against a heavy lug or stop at the lower end of this tray. There are two of these trays, one for each side of the main hoist (each side of the hoist being operated separately). The lug or stop mentioned above prevents the cartridge from going into the hoist shaft until the car is down. When the car reaches the bottom of the hoist the stop is thrown out by means of a hand-operated level, and the cartridge slides into the upper berth of the car by gravity. The throwing over of this lever operates through mechanical means, the tongue at the shell end of the hoist causing it to drop. .This acts as a safety measure to prevent the loading of the shell until the cartridge case is home; the reason for this being that the "hoist signal" is at the shell end of the hoist, hence the shell should be loaded last.

Two overhead trolleys are used; the outer one for removing shells from the shell room and placing them in empty shell racks in the turntable, the inner one for carrying cartridge cases from the magazine to the loading tray. The outer track has hand-operated switches at each door to the shell room, so that no transfers are necessary. The inner track is unbroken, a removable tray being fitted to the magazine door and extending far enough into the handling room to be plumbed by the inner track. This magazine door and tray are about 6 feet above the deck of the handling room, so that the tray does not interfere with other work.

Both shells and cartridge cases are handled by differential chain hoists which are suspended on wheels from the overhead tracks.

The shells are lifted by an ingenious shell clamp or shell hooks. These have two eyes, which when both are hooked on operate through a screw arrangement to draw in the lugs, which clamp into deep grooves in the rotating band of the shell. When the eyes are unhooked and brought to a horizontal position the screw backs out the lugs and releases the shell.

In connection with the turntable it is impossible to load both sides of the main hoist at the same time; i. e., one side must be loaded, then the table rotated slightly to bring the next shell into loading position for the other side.

The handling-room gear for the auxiliary hoist has been described under paragraph, "Auxiliary hoist."

Reloading Station.

Practically all the gear contained in the reloading station, with the exception of the reserve shell and powder racks has been previously described under various headings.

These racks hold 12 rounds and were probably for use only in case of an emergency. The racks are in two tiers, the upper tier holding the powder and the lower the shells. The height of each tier is such that when the hoist car is stopped at the reloading station the upper and lower trays of the car come in line with their respective tiers.

On the lower tier the shells are placed on two conveyors, six on each. Each conveyor is in the form of an endless belt and runs from outboard to the center of the turret (in front of main hoist), thence around a hexagonal wheel, and back, underneath to outboard again. There are 13 trays on each conveyor for holding the shell, only 6 of which can be filled at one time. The conveyor is driven by hand. Turning a hand crank operates through gearing and a worm to turn the outboard hexagonal wheel, this driving the conveyor. A foot pedal stops the conveyor in position for loading, similar to that on the turntable in the handling room.

On the upper tier of the rack the cartridge cases are placed in a holder with two semicircular arms to support the case. These arms are mounted on a pivoted horizontal shaft, with a locking lever and handle at the forward end. When locked the holder is in an upright position, and the cartridge case is immovable. When unlocked the holder is free to turn in either direction. Suppose, for instance, the inboard case has been loaded into the car and its holder is empty. It is now desired to get the next case into the inboard holder, to be ready to load the car again. To do this, the empty inboard holder is unlocked and turned to *outboard* to a horizontal position. The next inboard holder is unlocked and turned *inboard.* The case then rolls from this holder into the inboard holder, which is brought to a vertical position and locked. In this manner the cases may be passed from the farthest outboard rack to the inboard.

A somewhat similar set of reserve ammunition racks is installed on the gun platform in rear of the main hoist. This holds nine projectiles—no cartridge cases—in three tiers of three each. The lower tier is at the correct height to allow loading into the ammunition wagon for transfer to the breech. When the lower tier is empty the middle tier may be lowered into position by a crank, worm, gear, and cable mechanical arrangement operated from the rear side of the racks.

Sights and Telescopes.

The original installation of sight bars has been entirely discarded. The original sights were cross-connected to the trainer's sight and it is believed that they were used in connection with the ex-caliber gun formerly on top of the turret. Replacing this gun by the anti-aircraft now installed obviated the necessity for the old sights and a new and simpler system has been put in.

This system is very similar to our system and needs but little description. The sight arms (pointer's) are bolted to a plate above and moving with the trunnion. The relative position of sight to gun is changed by moving the range scale or azimuth drum, the sight being secured in an adjustable holder to the sight arms. In bore sighting the original position of this holder may be adjusted as desired to the line of the bore, and is securely held in this position by set screws.

The trainer's sight is still more simple. The sight is rotated slightly to right or left in its holder, as the azimuth drum is turned. Its holder is also adjustable on its shaft for the bore-sighting adjustment. Coming up on a small clamp at the side allows the telescope to be moved with the trainer's head in keeping on during a roll.

The azimuth drum is graduated on an arbitrary scale without drift lines, the center being 100 instead of 50.

Each pointer must fire his gun separately; the firing circuit is not cross-connected.

The pointer's hoods are fitted with periscope sights of excellent construction and design, made by Zeiss-Karoly. The lenses are very clear, and little or no parallax can be found in any of the telescopes. A particular feature of the telescopes is the variable field and magnification. By simply turning an adjustment wheel, similar to the focusing wheel, any magnification between 7 and 21 diameters may be obtained, with corresponding inverse variation of the field from 5.7° to 1.9°. The focusing attachment is also connected conveniently and easily adjusted. Another attachment throws into the line of sight either a plain, amber, blue, or smoked glass. A blank eyepiece is fitted for the unused eye and does away with the necessity of squinting. Sight lights are fitted as in our own telescopes.

The trainer's sight is a Carl Zeiss telescope, not periscope. It has the same characteristics as the pointer's sight, except that its magnification is less and its field correspondingly greater. The magnification is variable between the limits of 2.5 diameters and 7 diameters, and the field from 16° to 5.7°.

The turret officer's telescope is a Carl Zeiss, and is an offset box-like arrangement, for the purpose of giving it the necessary focal length in the short space available between the turret officer's station and the opening in the front of the trainer's hood. It also is a high-powered glass, having the same limits of field and magnification as the pointer's telescope, as well as the same other characteristics.

The telescopes are not fitted with vertical and horizontal cross wires as is the usage with us.

Turret Officer's Station and Communications.

The turret officer's station is in the trainer's hood, where he has a telescope mounted alongside that of the trainer. In addition to his

other duties, the turret officer must set sights for the trainer, as this is the only station at which the trainer's sight may be set. A range and deflection visual is placed in front of the turret officer when he is on station, where it can be easily seen, and the azimuth drum setting wheel is right at hand.

The necessary voice tubes and telephones for giving and receiving orders are grouped conveniently about the turret officer, also ready lights and firing bells, a firing gong being used instead of a buzzer.

The voice-tube communications are as follows: (*a*) To both pointers, one tube, (*b*) to hoist-control stations, (*c*) to central station. Telephone communications are (*a*) to fire-control station, (*b*) to central station, (*c*) to dynamo room.

Other voice-tube communications in the turret are (1) from trainer to hand training gear, (2) both main hoist-control stations to main hoist hand gear, (3) both main hoist-control stations to handling room, (4) both auxiliary hoist-control stations to auxiliary hand gear, (5) both auxiliary hoist-control stations to handling room.

The voice tubes for work in the turret are small, about $1\frac{1}{2}$ inches diameter, while the one to central station is large, about 4 inches.

Turret phones are of very light construction and are placed on the bulkheads. One attachment serves as both receiver and transmitter. No head sets are used. These phones are peculiar in the respect that all other phones about the ship, even when behind armor, are extremely massive and heavy. Orders given over the phone may be easily heard at some distance from the transmitter.

Ventilation.

Since semifixed ammunition is used in the turret, no high-pressure gas-ejector system is needed. But a ventilating system to keep smoke and gases from entering the turret through the guns is rigged and is operated by a small motor-driven fan placed just below the gun platform.

The driving motor is a shunt interpole, direct current, 100-volt motor, with a speed of 1,800 revolutions per minute. It is not rated, but is probably a 3-horsepower machine. It is, of course, constant speed. The fan draws air through an intake in the top of the turret and forces it through two vents, one of which leads into the inboard side of the breech, while the other discharges below and in rear of the breech. This creates a draft through the gun and keeps the personnel of the turret supplied with fresh air. The turret is not under pressure and makes no pretense to being air-tight.

Miscellaneous.

(*a*) *Lubrication.*—A unique system for lubricating inaccessible parts, such as roller paths, gun slide, etc., should be noted. Consider, for instance, the roller paths. From the reloading station

(inside the turret) a small hole is bored through the turret walls and upper bearing of the roller path to the rollers. To the inner end of this hole a cup is tapped in. This cup is then filled with vaseline or other heavy lubricant. The lid of the cup is threaded, and when it is screwed down the vaseline is forced through the hole into the roller path. It is presumed that the lid is set up a certain amount at stated intervals until the cup is empty, when it is refilled and the process repeated. There are a number of these cups around the entire circumference of the roller path, and are so placed as to be exceedingly easy to get at. A similar system is used on the gun slide, cased in gears, etc.

(*b*) *Armored hatch.*—The turret is fitted with an armored hatch in the top, which forms the principal method of entrance and egress. The hatch is to be noted for its easy working, being superior to anything I have seen in this respect. It is mounted on ball bearings and covered by a light metal casing, into which it slides when open. Opening and closing this hatch requires no effort whatever. Complete blue prints of it are inclosed with the report.

(*c*) *Securing gear.*—The only method of securing the turret for sea is to lock the guns in loading position, train the turret to a fore-and-aft position, set up on the turnbuckles and on the watershed. Two turnbuckles are provided, both of which attach to the turret under the overhang and lead to each side to deck pleats.

(*d*) *Speed of loading.*—The ex-Austrian commanding officer (the executive officer during the war) whom I relieved, stated to me that the trained crew could complete a load from the handling room in 20 seconds. But after working with the gear, and due to various safety-locking devices, I am inclined to doubt this statement. While time and men were not available to properly train a crew to test out the speed obtainable, it is my belief that the best that can be done is between 30 and 40 seconds.

(*e*) *Angle of train.*—The forward turret may be trained from broad on one quarter to broad on the other, and the after turret from broad on one bow to broad on the other, a total of 270° each.

24-cm. (9½-inch) Turrets. General Description.

There are four of these turrets, two on each side, located as are the 8-inch turrets in our *Connecticut* class. Each turret contains two 24 cm. (approximately 9½ inches) .45-caliber breech-loading rifles, and fire only semifixed ammunition.

An excellent feature of these turrets is their similarity to the 30.5-cm. (12-inch) turrets. In all except size and a few minor details they are an exact replica of the big turrets and operate in the same way.

The pivot rests upon a built-up foundation which is firmly attached to the inner bottom at just about the turn of the bilge. The position

of the roller path differs from the 30.5-cm. (12-inch), in this case being higher, about 2 feet above the level of the main deck inside the barbette. Access to the roller paths is difficult, being obtained through a small manhole from the gun deck. There are, however, inside the turret, several handholes through which the rollers may be examined and lubricated.

The location of the various gear on the various decks of the turret is the same except that the elevating motor generators are placed on the upper circle deck rather than the lower circle. The power leads enter the turret at the top of the handling room, and are transferred to the turret mains by carbon brushes riding on copper conductors just below the lower circle deck.

The handling room has two openings into the magazine. (Magazine and shell room are combined.) These on some of the turrets are simple doors, while on others rotating flame-proof doors were under process of construction. The work appeared to have been interrupted by the armistice, as tools, rivet heaters, etc., were left about the deck. This new door was simply a revolving door on a central shaft. A load was put in the magazine side of the door, the door was then rotated, and another load put into the new magazine side, while the first was being taken in the handling room.

These turrets also have the antiaircraft gun mounted on top instead of the ex-caliber gun shown.

The lower circle deck opens onto the cable passage, forming another means of entering the turret in addition to coming through the magazine or through the top.

No. 1 turret has an arc of train (left to right) from 0° to 140°; No. 2 from 40° to 180°; No. 3 from 180° to 320°; No. 4 from 225° to 360°.

It is believed that with a trained crew a load from the handling room could be completed in about 20 seconds, a considerable saving in time being possible, due to the easier handling-room operation and the faster hoists.

Guns, Mounts, and Recoil System.

The guns are 24-cm., 45-caliber breech-loading rifles, made by the Skoda Works in 1910, weight about 27,700 kilograms (about 25 tons). They fire an A. P. projectile (two sizes being used), using a cartridge case weighing 72 kilograms (about 159 pounds). The maximum range is 13,300 meters (14,550 yards). Elevation, 20°; depression, 4°.

The construction and mounting of the guns is exactly similar to that of the 30.5-cm. in everything except size. The recoil system is the same, even to the pressure used in the cylinders. The maximum recoil is 23 inches.

Breech Mechanism and Firing Circuits.

Exactly similar to the 30.5-cm. mechanism.

Elevating Gear.

Although the arrangement is slightly different owing to constricted space, the system for elevating is identical with that for the 30.5-cm. (12-inch) as regards operation, gearing, safeties, and locks, and elevating arc. The Ward-Leonard system of control is used, the motor being 440-volt, direct current, 1,600 revolutions per minute. The motor is placed under the pointer's platform. The greatest speed of elevation obtainable by power is 20° in 12 seconds, and the slowest by power is 20° in 3 minutes and 2 seconds. By hand one man can elevate the gun 20° in 26 seconds and two men can do the same thing in 17 seconds. The pointer's wheel runs fore and aft, and is practically over the trunnions. The pointer is provided with a comfortable seat.

Training Gear.

The training gear is also practically identical with that of the 30.5-cm., with the exception of slight differences in arrangement. The speed control is very good, although these turrets have a tendency to move in jerks, when training at full speed. With the speed lever on "full speed," the fastest speed obtaining is 90° in 19 seconds, and the slowest 90° in 6 minutes. With the speed lever on "normal," the highest speed obtainable is 90° in 52 seconds, and the slowest 90° in 6 minutes. With the lever thrown over for "slow speed," the best speed obtainable is 90° in 55 minutes, and the slowest 90° in 1 hour and 30 minutes. Training by hand, one man can train the turret 10° in 30 seconds, and four men can train 10° in 18 seconds.

Rammer Gear and Ammunition Wagon.

These are identical with the 30.5-cm. in every respect except size.

Main Hoist.

The main hoist is identical to that of the 30.5-cm. except in minor details of arrangement due to lack of space. The locking and safety devices, control, car-position indicator, and car are just the same, the only difference being a slight change in the arrangement of the gearing for hand or electric drive, the principle being unchanged. At full speed the car may be hoisted in 5 seconds, loaded.

Auxiliary Hoist.

The auxiliary hoist is very similar to the 30.5-cm. auxiliary hoist, but is even more cumbersome and more in the way. The principal difference is that there is only one break in the hoist casing in the handling room instead of two. Both projectile and powder charge are loaded into this one section, one piece being hoisted at a time. This hoist is also fitted with ready lights between control and the

handling room, which are not rigged for the big turret. The operation of these is simple, although their purpose is not absolutely clear. As the car passes the control station (reloading station) on the way down it strikes a lug, which completes a circuit and lights the light in the handling room. When the car starts up again, another lug in the handling room is hit, lighting a light at the control station. This seems to be a jury rig not included in the original installation. The car, locking devices, cut-outs, turret conveyor, etc., are identical with that on the 30.5-cm. auxiliary hoist.

Under full power a loaded car may be hoisted in seven seconds.

Handling-Room Gear.

The general idea of handling ammunition is the same for the 24-cm. as for the 30.5-cm., although many details of the system differ, and the 24-cm. is the simpler.

The main hoist is loaded in the same way—shell at the forward end and powder at the after end. A turntable containing 20 projectiles surrounds this hoist, but is considerably closer to it (due to more constricted space) than in the 30.5-cm. This closeness obviates the necessity for a tray between turntable and hoist, and thus simplifies loading the hoist. The turntable is easily revolved by hand power, the gearing for the hand drive being very similar to that of the big turret. The shell racks on the turntable, however, are an improvement on those of the 30.5-cm. in that they are attached to the turntable by a universal joint. They may thus be moved in azimuth as well as from a vertical to horizontal position. In case the turntable fails to stop at exactly the right point the rack may be swung to one side slightly, enough so that the shell may be directed into the hoist without readjusting the position of the turntable. When the rack is brought to a horizontal position the nose of the shell enters the opening of the hoist, and rollers on the rack and on the hoist car make it easy to slide the shell the rest of the way into the car.

The turntable is not stopped in loading position by a pedal lever and lug, as is the case with the 30.5-cm. Instead, a turntable indicator is installed. This is geared up to the turntable and is placed in front of the turntable operator, so that he may place any shell in position for loading on any hoist.

The powder case is loaded into a slide at the rear side of the main hoist and is held in position in the slide by a stop lug, as in the 30.5-cm. (12-inch) turret. The stop lug, however, is operated from the opposite (shell) side by a mechanically connected operating lever. When the car comes down the operator throws his lever, allowing the cartridge case to slide forward into the car; then when the projectile has also been loaded he throws the upper lever (oper-

ating the annunciator) over to "ready," and the car is hoisted. As soon as the cartridge case has been loaded into the car the stop lug (with lever) goes back to its up position by means of tension on the spring, and the slide is ready for its next load. When the car comes down the annunciator lever is thrown back to "load" ("beladen") by means of an arm in the hoist casing, which is struck by the car.

A third lever on the side of the hoist casing (labeled "geschoss entladen") throws up or down a shell stop in the lower tray of the car. This when up holds the shell in the tray, but must be thrown down when loading the car in the handling room. All three of these levers are operated by one man.

In all other respects the 24-cm. handling room is similar to the 30.5-cm. (12-inch) handling room.

Reloading Station.

The operation of the reserve racks (holding 12 rounds of both shell and powder) in the reloading station, and of the gun platform reserve racks holding 9 rounds is identical with that for the 30.5-cm. (12-inch) turret.

Sights and Telescopes.

The sights, telescopes, and their appurtenances are the same in the 24-cm. (9½-inch) turrets as in the 30.5-cm. (12-inch) turrets. The cross-connected system has been replaced with the system described for the 30.5-cm. (12-inch) turrets.

Turret Officer's Station and Communications.

The turret officer's station is equipped similarly to that in the 30.5-cm. (12-inch) turret, with the same phone and voice tube communications. The turret officer must act as sight setter for the trainer. All turret communications are the same as for the 30.5-cm. (12-inch) turret.

Ventilation.

The ventilation system is identical with that for the 30.5-cm. (12-inch) turrets.

Secondary Batteries. General Description.

The secondary battery consists of twenty 10-cm. (approximately 4-inch), 50-caliber breech-loading rifles, arranged 10 on each side—8 on the gun deck and 2 on the main deck. Each gun on the gun deck is placed in a separate armored casemate in the heavily armored citadel, and is protected by a gun shield about 3½ inches thick, this shield being mounted on the gun carriage and revolving with it.

There are two types of carriages in use aboard—one known as the "large shield" and the other as the "small shield." The two for-

ward and the two after gun-deck guns, and the four main-deck guns (total of eight) are the "large shield" type, all others being the "small shield" type.

Fixed ammunition, with nitrocellulose powder and an explosive projectile is used with this battery. A semiautomatic attachment was formerly attached to the guns, but has been removed from all of them. The guns have a range of 11,000 meters (12,035 yards), an elevation of 14°, and a depression of 4°.

The same system of numbering the guns as is used on our ships is used. Nos. 1, 3, 5, 7, 9, 11, 13, and 15 are on the starboard side gun deck; Nos. 2, 4, 6, 8, 10, 12, 14, and 16 are on the port side gun deck; Nos. 17 and 19 are on starboard side main deck, and Nos. 18 and 20 are on port side main deck.

The arc of train of the various guns is as follows (left to right):

Starboard.		Port.	
No. 1	0° to 120°	No. 2	240° to 360°
Nos. 3, 5, 7	25° to 153°	Nos. 4, 6, 8	207° to 335°
Nos. 9, 11, 13	35° to 153°	Nos. 10, 12, 14	207° to 325°
No. 15	45° to 175°	No. 16	185° to 315°
No. 17	0° to 120°	No. 18	240° to 360°
No. 19	45° to 180°	No. 20	180° to 315°

The fire of the secondary battery is controlled from the small control stations in the main deck gun casemates, as will be described later.

Gun, Mount, and Recoil System.

The gun is a 10-cm. (9-inch) 50-caliber breech-loading rifle, made by the Skoda Works at Pilsen. Weight, 2,025 kilograms (about 2¼ tons). Range, 11,000 meters (12,035 yards).

The gun appears to be a single tube without jackets of any sort. It is slightly belled at the muzzle and is rifled with plain section grooves. A rectangular opening is cut through the breech for the breechblock, and lugs are fitted top and bottom for the slide.

The mount is of the circular pedestal type, securely bolted to the deck, and very heavily constructed throughout. It rises about 2 feet above the level of the deck, and around its upper part is secured the training rack. On the upper surface of the mount is the lower roller path. Around the base of the mount is a circular plate marked in degrees and showing the angle of train by means of a pointer attached to the carriage. Eyebolts are fitted to the base of the mount for the securing turnbuckles. Inside the mount, where the carriage bears upon it, are fitted composition bushings.

The carriage has on its lower surface the upper roller path. The weight of the carriage is supported on the mounts by spherical steel rollers between the upper path on the carriage and the lower path on the mount. The afterpart of the carriage is cut away above the roller path to allow for the entrance of the recoil cylinders. A light metallic casing to protect the training rack is attached to the carriage. Over the exposed arc this casing is armored. The gun shield and the pointer's and trainer's platforms are also secured to the carriage. Meshing into the training rack is the worm, its shaft and sprocket drive wheels, which are also secure to the carriage. Extending drown through carriage and mount is the screw jack for jacking up the carriage. The carriage is tapped out to receive the threaded portion of this. The screw-jack is operated by a ratchet wrench at the top of the shaft. The operating gear for both elevating and training is secured to the carriage. The uppermost portion of the carriage forms the trunnion bearings.

The slide rests in the carriage on the trunnions and moves in elevation with the gun. Top and bottom of the slide are slotted to receive the guide lugs on the gun. To the slide are secured the elevating arc, sight yoke, and recoil cylinders. Secured to the forward end of the slide is a light armored shield, extending both above and below the slide, and for the purpose of covering the gun opening in the main shield. To the rear of the slide is attached a metal guard, which extends aft and prevents fouling the breech plug when it is opened. A recocking handle is also attached to the after end of the slide as described later. On a line with the trunnions under the center of the slide, is bolted a curved piece of machined steel which bears on a roller on the carriage. This roller in turn bears on a shaft (or bolt) extending down into the carriage and surrounded by spring washers. The position of the curved piece under the slide is adjustable, and by moving its position in a fore and aft line the clearance of the trunnions may be adjusted. Another use might be that, in coming back to battery, the curved piece takes up against the roller on the carriage, and, through the spring washers, somewhat deadens the shock.

The trunnions are separate parts of machined steel, and are put in position from outside, extending through the carriage and into the slide. The part in the carriage is threaded and screws into a bushing in the carriage. A bushing (unthreaded) also forms the bearing for the trunnion in the slide. Thus the trunnion is fixed to the carriage and the slide moves around the trunnion. The outer end of the trunnion is ratchet for a ratchet wrench for entering or removing the trunnions. They are not adjustable except as described in the last paragraph, but the bearings both in the carriage and slide may be easily replaced.

The recoil system consists of three cylinders—the two outer ones being about twice as long as the inner ones. All cylinders are securely bolted to the slide. The outer cylinders are open to the air at the forward end, and have two heavy springs around the piston rod. The outer cylinders contain springs and the inner glycerin. These springs are separated by a collar which rides free on the piston rod. The two separated springs are used rather than one long one to prevent buckling in the middle. The inner short cylinder contains glycerin, and a heavy piston. In the forward head of this cylinder is mounted a throttling plunger. The action of the system is as follows: The piston rods of all three cylinders are secured to a collar on the gun and recoil with it. As the gun recoils the pistons compress the springs in the outer cylinders and force the glycerin in the inner cylinder through the small clearance between piston and cylinder wall into the forward end of the cylinder. This combined action of springs and glycerin, but principally of the springs, checks the recoil and finally brings the gun to rest. The springs, being under high compression, start the gun in the other direction. This movement is checked by the passage of the glycerin from the forward end to the after end of the middle cylinder, around the piston, and at the end of the stroke is further throttled down and finally brought to an easy halt by the action of the throttling plunger as it enters the opening for it in the end of the piston. This plunger has a series of raised "webs" on it, which throttle down the passage of glycerin to the outside of the piston, one web coming into play after the other until all have entered the piston, by which time the piston (and hence the gun) has been brought to rest and is "in battery."

3. Breech Mechanism and Gun Firing.

The breech mechanism is of the sliding-wedge type, opening to the side. A semiautomatic attachment was formerly installed, but this has been removed and no gear connected with it is to be found aboard.

The breechblock is very similar in action to the large turret-breech mechanism—simply being on a smaller scale with a few minor changes.

The operating handle is on top and is secured to the gun in a horizontal position. From this handle a shaft with a short horizontal arm on the bottom extends down through the gun to the breech mechanism. Here a lug on the short arm rides in a curved slot in the top of the breech plug. Throwing the handle "out," works through the shaft and arm to the lug, which, by its action on the breech-plug slot, throws the breech plug out with the handle. Throwing the handle "in" operates in the opposite way to close the plug. One throw of the handle is all that is necessary. The plug works very easily, although not on rollers, due to its small size and clever machine work.

When the breech is thrown open a cam on the ejector shaft is struck at the end of the operation, which throws the ejector aft hard and starts the empty case out of the powder chamber. Ejector arms are fitted on but one side of the breech, and are mounted on a shaft with a cam as described.

Over the front of the breechblock is fitted a steel plate containing, opposite the position of the primer when the breech is closed, two holes, one for the electric and one for the percussion-firing pin. The percussion-firing pin, with its sleeve spring and rockers, is entered from the rear, while the electric-firing pin is attached to a leverlike part which is housed in a cavity in the front part of the breechblock, this cavity being covered by the face plate above mentioned.

The percussion firing pin rests in a rocker plate and is surrounded by the firing spring and the firing-pin sleeve. When the breech is opened a shaft, geared to the operating arm, is rotated. This shaft is vertical and extends from the top of the breech down to a level with the firing pin. To its lower end is secured a cocking latch. As this shaft rotates with the opening of the breech, the cocking latch forces the firing-pin sleeve to the rear, compressing the spring. At the end of its travel to the rear the sleeve is caught by a lug of the rocker plate, and the firing pin is held in this cocked position. When the breech is closed the reverse action of the operating lever brings the cocking latch back to its original position.

To recock the piece a recocking rod enters the breech from the side. A handle is secured to the outer end of this rod, and a recocking latch, similar to the cocking latch, to the inner end. The rod is rotated to the rear by means of the handle, and as it is rotated in the recocking latch forces the firing-pin sleeve aft, as in the case of cocking. A spring surrounding and attached to the recocking rod throws rod, handle, and latch back to the original position when the handle is released. If it is desired to put the firing mechanism on safety, this is also done by means of the recocking handle. It is drawn to its extreme aft position, where it is held by a spring catch. In this position the recocking latch is held in place against the sleeve so that the firing pin can not possibly move forward even if tripped.

The pointer (left) is equipped with a hand lever and a pedal for firing by percussion. Either may be used. These connect mechanically with the sear extending through the left side of the gun, so that when the lever is brought sharply to the rear, or the pedal pressed upon, the sear is forced to the rear. The sear is connected to the rocker plate in the plug and on being forced to the rear, rocks this plate to an angle sufficient to release the firing pin. A spring forces the sear back to the original position.

The current for the gun firing and lighting circuit is taken either from the ship's lighting circuit (stepped down to 4 volts through a rheostat in each gun casemate) or from batteries attached to each gun. The firing circuit is broken in four places as follows: (1) At the pointer's position—the firing key consisting of a plate mounted inside the pointer's wheel which, when pressed down by the thumbs, completes the circuit. (2) Between the gun and the slide—spring contacts are mounted, one on the gun and one on the slide, the circuit being broken when the gun recoils and not completed again until the gun has returned to battery. The springs keep this contact tight. (3) In the operating lever—two contact points on the gun and two on the lever operate to break the circuit as soon as the plug is started; open and do not close it until the breech is completely closed. (4) Inside the breech—a contact point on the firing pin arm and one on the gun operate to the same effect as No. 3.

Elevating Gear.

The elevating gear is situated on the left side of the gun only and is extremely simple. The handwheel is in a vertical position abreast the trunnions, and is connected, through two sets of incased bevel gears to the worm shaft. The worm on this shaft meshes with a large gear.

Mounted on the same shaft as this large gear is the elevating pinion, which gears directly into the elevating arc. The arc allows 14° elevation and 4° depression, and has a brass plate indicating the angle of elevation affixed to it, in a position to be easily read.

A mechanical limit stop is fitted to the slide, carriage, and worm shaft, which automatically locks the worm shaft when either the limit of elevation or depression has been reached, and prevents any further turning of the pointer's handwheel. This consists of stop lugs attached to the slide, and which, when the gun reaches full elevation or depression, strike a lever arm attached to the carriage. This arm acts on a spring plunger (also attached to carriage) and forces it down. The plunger forces down another arm, which has a pawl at its end. This pawl engages a locking gear on the worm shaft and prevents further rotation in one direction, although the shaft is free to rotate in the other direction. As soon as the pointer's handwheel is turned in the other direction the pawl rides free of the locking gear, and the stop lug releases the spring plunger and the system is reset. There are two lugs, plungers, pawls, and gears—one for elevation and one for depression.

The elevating gear "follows up" closely with practically no lost motion, and yet is very fast. It is possible to elevate 10° in two seconds.

Training Gear.

The training gear is cross-connected and may be operated by either the pointer or the trainer, although it is usually operated from the right side by the trainer. The trainer's wheel is in the same position on each side of the gun, and the gearing is the same. The trainer's wheel (which is in a horizontal position) drives a horizontal shaft through a set of bevel gears. On the inner end of this shaft is a sprocket wheel and chain, which drives a similar wheel at the end of the worm shaft. This turns the worm shaft, which has the training worm at its center, meshing with the training rack, and hence trains the gun. The training wheel on the other side of the gun connects in the same way (through bevel gear, sprocket wheel and chain) with the sprocket wheel on the other end of the worm shaft.

The gun mount is fitted with limit stops. When the gun has reached either limit of train, a lug on the carriage comes against the stop on the mount and prevents further forcing. There is no "plunger-pawl" arrangement as for elevating.

The training gear operates very easily and fast, but some considerable lost motion is encountered in changing the direction of train, due to the give in the sprocket chain. The gun may be trained 45° in four seconds.

An angle of train indicator (a brass circular plate is fitted through the base of the mount), with a pointer affixed to the carriage, to indicate the number of degrees of train at any time.

Sights and Telescopes.

A yoke sight without any unusual features is mounted on the slide of these guns. The clamps holding the forward end of the telescopes are fixed to the slide, while the after end moves with the sight yoke. Both range and deflection is handled by one sight setter, on the right side of the gun, to the rear of the trainer. The sights are set in elevation by turning a large hand wheel. This connects, through two plain gears, two bevel gears, and a worm to the sword arm, a rack attached to the after end of the sight yoke and moves the sight yoke up or down. The range scale is driven by a small pinion off another small rack attached to the upper part of the sword arm and turns the range scale with the turning of the hand wheel.

Instead of an azimuth drum for the setting deflection, a narrow plate (about 1 inch side) is mounted on the sight yoke, and a "pointer" arm affixed to the slide bears against the plate. The plate is graduated from 50 to 150 with 100 as zero deflection, and the deflection is set by sliding the plate along (and with it, the after end of the sight yoke) until the desired setting comes under the straight edge of the pointer arm. This moving of the sight yoke in azimuth

is accomplished by turning a small hand wheel mounted on the end of a screw which works in a nut attached to the sight yoke—the nut not being free to revolve with the screw. The pointer arm is curved to form an arc of a circle of which the fixed point of the sight yoke is the center. This is done so that the arm will bear snugly against the deflection plate at all elevations. The straight edge of the pointer arm is set at a slight angle to the fore and aft line of the gun, and the graduations on the plate are engraved at the same angle. Due to this, when the range is changed, the deflection setting is automatically thrown off and must be reset. This corresponds to the drift lines on our azimuth drums.

All sights, range scales, etc., are fitted with night lights. The same type telescopes are fitted for both pointer and trainer. These are "Carl Zeiss," periscopic telescopes, with a variable magnification of from 2.5 to 7 diameters and a varying field from 16° to 5.7°. In addition to the variable magnification attachment, they are fitted with a focusing attachment and a colored-glass attachment, the latter having clear, amber, blue, and smoked lenses. They are all excellent glasses. The inverted V arrangement is used in all of them instead of our cross wires.

Communications.

Each gun is equipped with voice tubes, range and deflection visuals, target-bearing indicators, and firing gongs. No telephones are used. Situated on the main deck is a small circular armored station for controlling the fire of the broadside battery. There are two of these control stations, one for each side, between guns Nos. 17 and 19 and Nos. 18 and 20. All guns have communication by 2-inch voice tube with the control station on their respective sides and with no other stations.

Range and deflection visuals (as described under "Fire control") are operated from these control stations, also firing gongs and target-bearing indicators, all being electrically operated.

Secondary Battery Hoists.

There is an ammunition hoist for each two 10-centimeter (4-inch) guns. On the deck these are placed in a convenient position outside the casemates, but on the main deck the hoist is inside the casemate, the two casemates on each side being interconnected. Guns Nos. 1, 2, 3, and 4 are supplied from the forward 10-centimeter (4-inch) magazine, which extends the entire beam of the ship, with one hoist on each side. Guns Nos. 5, 6, 7, and 8 are supplied from the two forward wing magazines, one magazine on each side, each magazine containing one hoist. Guns Nos. 9, 10, 11, 12, 13, 14, 15, and 16 are supplied from the after 10-centimeter (4-inch) magazine, two hoists on each side. Guns Nos. 17, 18, 19, and 20 (on the main deck) are

supplied from the two after wing magazines, one magazine on each side, each magazine containing one hoist.

These hoists are placed inside the magazine and may be operated either by power or by hand. All operation is from the top of the hoist. For power operation a 100-volt, 27-ampere, 1,100 revolutions per minute shunt interpole direct current motor is used, with a starting rheostat. Hoisting to the gun deck requires 20 seconds, and to the main deck, 24 seconds by power.

The hoist is of the sprocket-chain type, with a horizontal shaft with sprocket wheel on both ends at both top and bottom of the hoists. The sprocket wheels and chain on one side are for motor drive, and those on the other for hand drive, attached to the chains are the carriers, 13 to the hoist. These carry two shells each and come up loaded, pass over the sprocket wheels, and go back down to the magazine empty. The carriers are so spaced that an empty carrier is in loading position in the magazine when a loaded one is in unloading position at the top of the hoist. Thus six loaded carriers (12 shells) are in the hoist at one time, and after one load has been unloaded only a hoist of a few feet is required to bring the next two shells to the top.

Each carrier has three parts—the base and two sets of clamps for holding the shell, the shell being hoisted in an upright position. The base is simply a steel framework to support the base of the shell during hoisting. Above this, about 18 inches apart, are the two sets of spring clamps which grip the shell and hold it upright.

The motor drives the upper sprocket wheel shaft through a set of gears and an auxiliary sprocket chain and wheel. Turning a small handwheel throws this gearing out, and the upper sprocket wheel shaft is now free to turn by means of hand cranks attached to either end of this shaft.

When the loaded carrier nearly reaches the top of the hoist the noses of the projectiles enter a pair of socket clamps. As the hoist continues up these sockets (which are mounted in a crosspiece between three vertical rods) force the crosspiece and rods up against the action of a spring. On the center rod is a rack, which meshes into a small gear on a shaft which has a cam at the other end. As the rod is forced up this gear turns, and with it the cam. Through the action of the cam, when the hoist reaches the top a friction band brake is set on the motor shaft, and the electric cut-out switch is thrown, thus automatically stopping the motor. When the carrier has been unloaded a small hand lever is thrown, which releases the cam, allowing the motor to start and the springs on the socket rods to force the socket back into position to act on the next pair of shells. The socket above mentioned also acts to hold the nose se-

curely, keeping the shell in an upright position until the carrier is unloaded.

In case of accident or jam in the magazine the motor can be stopped by means of a pedal-operated friction band brake on the bottom sprocket-wheel shaft, and by a lever by means of which the electric cut-out switch may be thrown out—a small wire cable leading from the lever to the switch. It can only be started again, however, from the top of the hoist.

Each hoist has voice-tube communication from the magazine to the top of the hoist.

"Small Shield" Type—Differences.

The "small shield" type differs from the "large shield" type in practically only details of arrangement. Due to the lesser arc of fire of these waist guns, and consequently of small port opening, the shield is of a greatly reduced diameter. This prevents the pointer and trainer from being stationed inside the shield, and necessitates all the elevating and training gear being placed much farther aft on the gun, with a corresponding change in the gearing. The mechanical limit stop for elevating and depressing is differently located and an additional set of stops is placed on the sight gear—these operating in an identical manner with the gun-elevating stops—as sight elevating and depressing mechanical limit stops. The telescopes are of a different style, being about 4½ feet in length, this being necessary to reach aft to the pointer's position and forward to the opening in the shield. The trainer's telescope is periscopic, the trainer facing at right angles to the arc of fire. The characteristics of these are the same as for the large shield type.

Antiaircraft Gun. General Description.

These are 7-cm. (approximately 2¾-inch), 50-caliber, breech-loading rifles, firing fixed ammunition with a shrapnel projectile with time fuse. They are mounted on the turrets in the positions formerly occupied by the 7-cm. ex-caliber guns. On the *Zrinyi* they are mounted one to each turret, while on the *Radetzky* the after 30.5-cm. (12-inch) turret has two mounted side by side. All guns have an all-round train and an elevation of 90° and a depression of 5°. This range is 7,400 meters (7,660 yards).

They work very easily and are extremely simple. The only unusual features are the sights—all other parts being in common use. It requires 10 seconds to train 90° and 32 seconds to elevate 90°.

Gun, Mount, and Recoil System.

The gun is seemingly of single tube construction with a slightly bell muzzle, and lugs for the slide near the breech. It is rifled in plain-section grooves. It resembles the 10-cm. (4-inch) gun in everything but size.

The mount is built up so as to be level on the sloping turret roof, and is securely bolted down to the turret. It is a simple pedestal mount with training rack at its top. The center of the pedestal is hollow, and the carriage fits into this hollow part. The weight of the carriage is supported on a spherical steel surface, resting upon a like spherical steel surface in the base of the pedestal. No rollers are provided, and no method is provided for adjusting the position of the carriage in the mount. All parts subject to friction between carriage and mount are made as renewable composition bushings.

The carriage fits into the mount as described and has attached to it the training worm meshing into the rack on the mount, the training and elevating gear and the four seats of the pointer, trainer, and the two sight setters.

The trunnions which are on the slide, rest in trunnion seat on the carriage, and are held down by the cap square. The slide also carries the recoil cylinders and the sight mechanism.

The recoil system is the same as for the 10-cm. (4-inch) guns, but differently arranged. The short glycerin cylinder is placed under the gun and the spring cylinders on top of the gun. The action, however, is unchanged. On the after end of the bottom cylinder piston rod (outside the cylinder) are fitted two spring washers to assist in taking up the shock of the counter recoil.

Breech Mechanism and Gun Firing.

The breech plug is of the sliding wedge type, opening to the bottom similar to our 3-inch Hotchkiss mechanism. The plug is dropped when the operating lever is thrown, by means of a stud on the inner end of the operating lever shaft working in a cam groove in the side of the breech block. This action is also communicated to the inside of the plug to the sleeve surrounding the striker, drawing it aft and cocking the piece. For recocking, a recocking rod enters from the right side and draws back the striker sleeve against the action of the firing spring and recocks the piece. This recocking rod is operated by a lever on the side of the breech. Drawing back the lever recocks the piece.

For firing by percussion a sear shaft extends under and across the rear end of the breech. A sear, holding the striker sleeve, is affixed to the middle of this shaft, so that when the shaft is turned the sear releases the striker. A combination firing pin is used. It enters the breech from the bottom and is continually held in position against the primer of the cartridge case by means of a light spring. The lower end of this has the electric firing connection, and the circuit through the pin is insulated. Completion of the circuit through the firing key thus electrically fires the gun. In percussion firing, when the striker is released as previously described, it plunges forward and strikes the

flat after surface of the firing pin a forceful blow, driving it into the primer.

On the right lower side of the breech is a safety arrangement. This is simply a collar on the sear shaft, which, when turned to "safety," locks it and prevents its being fired, at the same time breaking the firing circuit.

The sear shaft may be turned for percussion firing either by a firing pedal at the pointer's seat, mechanically connected to the left end of the sear shaft or by a firing lanyard connected to the right end. the sear shaft or by a firing lanyard directly connected to the right end.

The electric firing circuit receives current from a set of dry cells secured to the gun carriage. The firing circuit is broken in three places: (1) In the safety arrangement just described; (2) in a spring contact, one contact point being on the breech and the other on the slide, this contact not being completed until the gun is in battery; (3) in the operating handle, the contact not being complete until the breech is entirely closed and the handle in its closed position, when a small insulated piece in the bottom face of the handle completes the circuit between two contact points in the firing circuit, and attached to a bracket on the breech.

Elevating Gear.

The elevating and depressing of the gun can only be done by the pointer from the left side. The pointer faces in the line of fire and has the elevating wheel in a vertical athwartships position at hand. The turning of the wheel drives a worm shaft through two gears. The worm on this shaft meshes into a large gear, which carries the elevating pinion on the same shaft. The pinion meshes into the elevating arc. The gear up to and including the pinion is all attached to the carriage, while the arc is attached to the slide. A scale on the arc shows the angle of elevation. No mechanical limit stops or friction gear is affixed. The gear works very smoothly and "follows up" nicely.

Training Gear.

The trainer's position is normally on the right side of the gun, but the gear is cross connected, so that the training may be done from either side. The left trainer's wheel is in a vertical fore-and-aft position, while the right trainer's wheel is vertical, but set at a slight angle from the athwartship's position. Both wheels, however, are connected through an appropriately beveled set of gears to either end of the worm shaft. This worm shaft is in a horizontal position on the forward side of the carriage, and the worm on it meshes directly into the training rack. The gear works very easily with barely perceptible lost motion.

All gears and worms are protected by a heavy metallic casing.

Sights and Telescopes.

The arrangement of sights on this gun seems to be particularly good. The pointer's sight arm and the trainer's sight arm are not cross connected, each working independently of the other.

The pointer's arm is secured to the slide at the forward end, through a sliding bearing, which also rotates about a horizontal axis. At the after end it is secured to the carriage by a bracket. The telescope holder is movable on the sight arm both in elevation and in azimuth. When the gun is elevated the sight arm elevates with it, due to its sliding connection to the slide. To change the relative position of the gun and sight arm, the whole after end of the sight arm is raised by means of a hand-operated male and female thread on the shaft and in the bracket to which the after end of the arm is attached. The range scale is geared off this screw, so that the amount of raising or lowering is determined by the reading of the range scale.

Changes in azimuth and additional small changes in elevation are made by the spotter, by the manipulation of two small hand adjusters. The spotter sits facing the gun (at right angles to the line of fire) just forward of the pointer on the left side. The telescope holder on this side carries two telescopes permanently attached parallel to each other, and moving together. One of these is periscopic and is for the spotter, the other is for the pointer. The eye end of each is attached to the body of the telescope by a universal joint, so that both spotter and pointer retain a comfortable upright position regardless of the angle of fire. The pointer's telescope has the usual inverted V cross wires, while the spotter's telescope is marked by numerous cross wires into squares, seemingly upon some arbitrary scale. "100" is the center point for both vertical and horizontal wires, and the limits on the lens are 40 to 160. The two adjusting wheels at the spotter's hand have scales attached which are graduated to the same arbitrary scale. Hence, moving the azimuth adjusting wheel through a distance to the right of "10" (or plus 10), as shown on the scale, moves the telescope holder in azimuth sufficiently to bring the point of aim of the spotter's telescope (and hence also the pointer's telescope) "10" to the right of where it formerly was.

The azimuth adjusting wheel is placed just below the spotter's sight, available to his right hand. This moves the telescope holder in azimuth by means of a fixed screw and movable nut, the latter being built into the holder. The azimuth scale is geared off and works simultaneously with the holder. The vertical adjusting wheel is placed below and forward of the other and is operated by the spotter's left hand. This operates directly through a screw and nut, similarly to the other, to raise or lower the forward end of the holder. Geared off of this and operating with it is the vertical scale. Both the azimuth and the vertical scale are exactly alike and are graduated with the same arbitrary graduations, running from 70 to 330.

The right sight arm has its after end bolted to the trunnion of the gun, while its forward end is secured to the carriage through a bearing which allows of rotation in a vertical plane. To the forward end is affixed the adjustable telescope holder. The sight arm, through its connection to the trunnion (this connection being in the form of a link mechanism) moves in elevation with the gun. The telescope holder is movable in azimuth on the arm by means of an azimuth adjusting wheel and scale identical to the spotter's. The holder may also be adjusted vertically by means of an adjusting screw which allows considerable latitude in this adjustment. Since this need not be an accurate adjustment for the trainer, and is simply to allow him to keep the target in the field, no scale is attached. There is but one telescope on this side, fitted with a universal joint, as in the case of the others, and having single horizontal and vertical cross wires, as in our telescopes.

The operation of the sights is believed to be as follows: The pointer and spotter, the latter also acting as sight setter for the pointer, take seats on the left side of the gun, while the trainer and his sight setter take seats at the right side. Observers at the control stations observe the angle of elevation, the relative angle to the ship, and the range of the target. These control stations are placed close to each antiaircraft gun, and are fitted with range finders and quadrants with sighting arms for observing the angle of elevation. (These quadrants are marked, in addition to being graduated in degrees, with several lines and figures, the meaning and use of which are not understood.) The angle of elevation and relative angle are simply to assist in picking up the target. These observations are sent to the gun by word of mouth, and the pointer picks up the target while the spotter sets the sights for range and places the initial correction on the adjusting scales. The first shot (shrapnel) is fired, and after firing the pointer must continue to keep "on" until the white puff of smoke, or "burst," is seen. As soon as the "burst" shows, the spotter observed the number of units on his lens that it is, both horizontally and vertically, from the point of aim. For instance, say the "burst" was "10" to the right and "10" too low. Then the spotter removes his eye from the telescope and with his right hand moves the azimuth, adjusting the scale to read "10" less, and, with his left hand, moves the vertical adjusting scale to read "10" more. He communicates the new reading of the azimuth scale to the trainer's sight setter, who sets the trainer's sights correspondingly. This process continues throughout the firing.

Inside of each adjustment scale, both azimuth and vertical, is another graduated scale, which can be set by hand independently of the adjustment scale. The graduations on these also run from 70

to 330. The purpose and use of these are not clear, but it is presumed that they are used in adjusting the pointer's and trainer's sights to read the same when on the same point of aim (bore sight adjustments) and for placing initial corrections on the sights.

Communications.

All guns are operated independently by word of mouth from their own control stations. There are no voice tubes, telephones, or visuals provided.

Hoists.

Ammunition is brought from the turret magazines in the turret hoists in containers, each containing six charges.

On the *Radetzky* ready ammunition boxes are fitted to the outside of the turret. On the *Zrinyi* a supply of ready ammunition is kept inside the turret.

Fire Control.

But very meager information could be obtained on this subject other than the system of communications between fire-control stations. It is believed either that the fire-control instruments were destroyed before the ships were turned over or that the system was largely a mental one not requiring the use of instruments. Practically no instruments were found aboard, although in several stations it was evident that an instrument of some sort had been removed. There is no plotting room and no substations. It is believed that any plotting that was done, was done in the large central station. Ranges for the turret guns may be sent out from any one of five control stations.

Spotting stations were in both crow's nests, with visual and voice tube communication to control stations. The principal range finder station was on the upper bridge, with two auxiliary range finders in the mast control station, one in each secondary battery control station, and one on the after control tower.

The telephone communication system is very poor and was apparently little used, the voice tubes and visuals being principally relied on. No head phones are used, with the exception of one set found in central station. The phones are heavy, cumbersome, bulkhead fixtures, each phone being arranged for but very few connections, making it necessary to man half a dozen phones in order to be in communication with all units at one time.

Six types of visuals are in use, all being electrically operated. These types are as follows:

1. Control Visuals.—This type has the transmitter end at the control stations and the receiver end at the various battery stations. It has two scales with two pointers. The inner scale indicated the rela-

tive bearing of the enemy, while the outer gives various orders, as "Commence firing," "Shrapnel," etc., to the battery.

2. Range Finder Visual.—The transmitters of these are placed at the range finder stations, and the receivers at the control stations. The dials have three scales and three pointers. The inner scale indicates thousands of meters of range, the middle scale indicates hundreds of meters (subdivided to 50 meters) while the outer scale indicates the relative bearing of the enemy.

3. Range and Deflection Visuals.—The transmitters of these are in the control stations, and the indicators at the guns. The dial has two concentric scales and three pointers on it. The lower half of the inner scale indicates deflection, "100" being zero. The upper half of the inner scale indicates thousands of meters while the outer scale integrates between the thousands to 50 meters.

4. Spot Visual "A."—The transmitters are at the spotter's stations and the receivers at the control stations. They have one scale and one pointer, indicating "Short," "Over," "Hit," "Number of Shorts," etc.

5. Spot Visual "B."—These are exactly similar to the "A" type except that they will register a greater number of shorts, being used for the secondary battery, while the "A" type is used only for the main battery.

6. Bearing Visual.—The transmitters of these are in the secondary battery control stations with indicators at all 10-cm. guns. They simply register the relative bearing of the enemy, and, by means of colored segments on the indicator, show at a glance when the enemy is in the firing arc of any particular gun.

The various fire-control stations are designated as follows:

1. Main fire control.....Forward conning tower.
2. After fire control.....After conning tower.
3. Central station.....Below forward conning tower.
4. After central station.....Below after conning tower.
5. Mast fire control.....In top at foremast crosstrees.
6. Port and starboard secondary battery control.....Between main-deck gun casemates.
7. Spotting stations.....Fore and main crow's nests.
8. Rangefinder and searchlight stations.

Main Fire Control Station.

This is a narrow, curved booth built into the forward conning tower. It is just forward of, and about a foot lower than, the main conning station (upper deck of conning tower). The booth is steeped down so as to allow the conning station an obstructed view ahead (through slits) over the top of the fire-control booth. The booth is heavily armored and is also provided with slits through which may be seen a large arc of the horizon, from dead ahead to

well on the quarter. The booth is so narrow as to make it difficult for two men to pass in it, hence it is believed that for battle exercises there are about 12 men stationed here to man the various phones, voice tubes, visual transmitters, etc.

The various instruments and communications at this station are as follows:

Telephones:

1 connecting with both starboard 24-cm. (9½-inch) turrets (2 connections).
1 connecting with both port 24-cm. (9½ inch) turrets (2 connections).
1 connecting with both 30.5-cm (12-inch) turrets and with both 10-cm. (4-inch) control stations (4 connections).
1 connecting with forward and after crow's-nests, after fire control after central station, after dynamo room, and after range finder (6 connections).

Voice Tubes.—(All 2-inch unless otherwise designated.)

3 to central station (one 4-inch).
1 to starboard, 10-cm. control station.
1 to port, 10-cm. control station.
1 to forward, 30.5-cm. transformer room.
1 to forward dynamo room.
1 to forward conning tower and forward range finder.

Visuals.—("T" at end indicates transmitter.)

1 control visual to both 30.5-cm. turrets (T).
1 control visual to both starboard 24-cm. turrets (T).
1 control visual to both port 24-cm. turrets (T).
1 range-finder visual from forward range finder (T).
1 range-finder visual from forward range finder (T).
1 range and deflection visual to both 30.5-cm. turrets (T).
1 range and deflection visual to both starboard 24-cm. turrets (T).
1 range and deflection visual to both port 24-cm. turrets (T).
1 range and deflection visual from starboard 10-cm. control station.
1 range and deflection visual from port 10-cm. control station.
1 spot visual "A" from forward crow's nest.
1 spot visual "B" from after crow's nest.
1 spot visual "B" from starboard 10-cm. control station.
1 spot visual "B" from port 10-cm. control station.
2 revolution indicators from engine room.
Salvo buzzers for all turrets.

The conning tower proper contains telephone and voice-tube communications with both torpedo rooms. Nothing resembling a torpedo director was found, although on each side is a place from which some electrical contrivance has been removed. On each side of the conning tower is a semicircular dumb pelorus for obtaining the bearing of the enemy. This is marked to show the angle of fire of each gun, so that the number of guns that bear may be told at a glance. The ship is fitted with gyro compasses, but these have not been applied to fire control in any way.

Central Station.

This is a large room about 20 by 8 feet, directly below the conning tower on the upper platform deck, and forming the base of the armored tower. It is believed that any plotting or tracking which was done here, although no instruments were to be found. The gyro compass (master) and various appliances and communications for ship control. The fire control apparatus here is as follows:

Telephones:

1 to the after central station.
1 to all turrets and both 10 cm. control stations (8 connections).
1 to after fire-control station.

Voice tubes:

1 to forward 30.5-cm. turrets (4-inch).
1 to after 30.5-cm. turrets (4-inch).
1 to starboard forward 24-cm. turret (4-inch).
1 to starboard after 24-cm. turret (4-inch).
1 to port forward 24-cm. turret (4-inch).
1 to port after 24-cm. turret (4-inch).
3 to main fire-control station (one 4-inch).
1 to after fire-control station (4-inch).
1 to forward dynamo room.
2 to forward range finders.

Visuals:

1 control visual to both 30.5-cm. turrets (T).
1 control visual to both starboard 24-cm. turrets (T).
1 control visual to both port 24-cm. turrets (T).
1 range finder visual to forward range finder (T).
1 range and deflection visual to both 30.5-cm. turrets (T).
1 range and deflection visual to both starboard 24-cm. turrets (T).
1 range and deflection visual to both port 24-cm. turrets (T).

Central station also contains switchboards for all fire-control circuits.

After Fire Control Station.

This is on the upper deck of the after fire-control tower and contains the following apparatus:

Telephones:

1 to after 30.5-cm. turret.
1 to after starboard 24-cm. turret.
1 to after port 24-cm. turret.
1 to after crow's nest.
1 to main fire control.

Voice tubes:

3 to after central station.
1 to after 30.5-cm. turret.
1 to after starboard 24-cm. turret.
1 to after port 24-cm. turret.
1 to after starboard 10-cm. control.
1 to after port 10-cm. control.
1 to after torpedo room.
1 to after searchlight platforms (upper and lower).

Visuals:

1 range finder visual to after range finder (T).
1 range finder visual to forward range finder.
1 spot visual "B" to after crow's nest.

On the deck below this, which is the after conning station, is one telephone to forward central station. On the next deck below (gun deck) one voice tube to the after searchlights and one range finder visual from the after range finder.

After Central Station.

The two lower decks (berth and upper platform) of the after conning tower form the after central station, which is fitted with the following apparatus:

Berth Deck—Voice Tubes:

1 to starboard, 10-cm. control.
1 to port 10-cm. control.

Berth Deck—Visuals:

1 to control visual to 5 forward starboard 10-cm. guns (T).
1 to control visual to 5 after starboard 10-cm. guns (T).
1 to control visual to 5 forward port 10-cm. guns (T).
1 to control visual to 5 after port 10-cm. guns (T).
1 range and deflection visual to 5 forward starboard 10-cm. guns (T).
1 range and deflection visual to 5 after starboard 10-cm. guns (T).
1 range and deflection visual to 5 forward port 10-cm. guns (T).
1 range and deflection visual to 5 after port 10-cm. guns (T).
Buzzers for all 10-cm. guns.

Upper Platform Deck—Telephones:

1 to main fire control.
1 to forward dynamo room.
1 to forward central station.

Upper Platform Deck—Voice Tubes:

1 to after 30.5-cm. turret (4-inch).
1 to after starboard 24-cm. turret (4-inch).
1 to after port 24-cm. turret (4-inch).
3 to after fire control station (one 4-inch).
1 to after dynamo room.
1 to forward central station (4-inch).

Upper Platform Deck—Visuals:

1 control visual to 30.5-cm. turret (T).
1 control visual to starboard 24-cm. turret (T).
1 control visual to port 24-cm. turret (T).
1 range and deflection visual to 30.5-cm. turret (T).
1 range and deflection visual to starboard 24-cm. turret (T).
1 range and deflection visual to port 24-cm. turret (T).
Salvo buzzers to all turrets.

Mast Fire Control.

The "fighting top" at the crosstrees of the foremast is principally a range-finder station, but is also fitted for the control of the turret guns. It is large and roomy (about 12 by 4 feet) and is easily

reached by two ladders. Height above water line approximately 75 feet. It is fitted with two 2-meter range finders, one on each side, also with two target-bearing indicators. These target-bearing indicators are electrically operated by small crank on the side—the alidades are moved to bear on the target by turning the crank, which at the same time makes the necessary contacts for registering in the control stations on visuals. In addition to these the mast control station contains the following apparatus:

Telephones:

1 to both starboard 24-cm. turrets (two connections).
1 to both port 24-cm. turrets (two connections).
1 to forward 30.5-cm. turret, after 30.5-cm. turret, port and starboard 10-cm. control stations (four connections).
1 to forward crow's nest, after crow's nest, after central station, after range finder, after dynamo room, after conning tower (six connections).
1 to forward central station.

Voice tubes:

1 to forward central station.
1 to main fire control.
1 to starboard 10-cm. control.
1 to port 10-cm. control.
1 to forward crow's nest.
1 to forward dynamo room.

Visuals:

1 range finder to after range finder (T).
1 range finder visual to forward range finder (T).
1 range and deflection visual to both 30.5-cm. turrets (T).
1 range and deflection visual to both starboard 24-cm. turrets (T).
1 range and deflection visual to both port 24-cm. turrets (T).
1 spot visual "A" to main fire-control and central station (T).
1 spot visual "B" to after crow's nest.
1 spot visual "B" to forward crow's nest.
1 spot visual "B" to both 10-cm. control stations.

Starboard and Port 10-cm. Control Stations.

These stations are small, circular, armored booths, built into and placed between the main deck gun casemates, one on each side of the ship at the waist. The upper part of these booths extends slightly above the top of the casemates, and this part is revolving with a built-in 8-foot range finder. The range finder is operated by a man on a platform inside the booth. Just below this revolving part the booth is open for a depth of about 6 inches, giving an unobstructed view of that entire side of the horizon. Each booth is also fitted with two target-bearing indicators of the type described for the mast control station, one for use forward of the beam and the other for use abaft the beam. Other fire-control instruments are as follows:

Telephones:

1 to main fire-control and mast-control stations (2 connections).

Voice tubes:

1 to central station and mast-control station.
1 to main fire control.
1 to forward dynamo room.
1 to guns Nos. 2 and 18.
1 to guns Nos. 4, 6, and 8.
1 to guns Nos. 10, 12, and 14.
1 to guns Nos. 16 and 20.
1 to gun deck forward (top of forward hoists).
1 to gun deck aft (top of after hoists).
1 to after fire control.
1 to after central station.

Visuals:

1 control visual to forward port group (5 guns) (T).
1 control visual to after port group (5 guns) (T).
1 range-finder visual from mast-control station.
1 range-finder visual from after range finder.
1 range and deflection visual to forward port group (5 guns) (T).
1 range and deflection visual to after port group (5 guns) (T).
1 spot visual "B" from forward or after crow's nests.
1 revolution indicator from engine room.
Firing buzzers for all port guns.

NOTE.—In the above only the apparatus found in the port 10 cm. (4-inch) control station has been described. That in the starboard station is exactly similar except that the numbers of the guns, of course, will be different.

Spotting Stations.

The fore crow's nest was apparently the main spotting station, and the main crow's nest the secondary spotting station. These crow's nests are at a height of approximately 110 feet above the normal water line, and are reached by a single ladder of iron rungs attached to the mast. They are very small and will not accommodate more than three men without crowding. Their fittings are very few and are as follows:

Forward Crow's Nest—Telephones:

1 to main fire control, and forward central station.

Forward Crow's Nest—Voice tubes:

1 to mast control station.

Forward Crow's Nest—Visuals:

1 spot visual "A" to main fire control, central, and mast control.
1 spot visual "B" to starboard 10-cm. control station.
1 spot visual "B" to port 10-cm. control station.

After Crow's Nest—Telephones:

1 to after fire control.
1 to main fire control, central station, and mast fire control.

After Crow's Nest—Visuals:

1 spot visual to 10-cm. controls, main fire control, after fire control, and mast control (T).

Range-Finder Stations.

Three of the range-finder stations coincide with fire-control stations, so that in these stations the apparatus and communications have been previously described. The other two stations (on the upper bridge and on the after control tower) are provided with communications as follows: The upper bridge station has telephone communication with main fire control, central station, and mast fire control; it is also fitted with a range visual (transmitter) to main fire control, central station, and mast fire control. The after range-finder station is equipped with both a telephone and range-finder visual (transmitter) to after fire control, main fire control, central station, and mast fire control.

Searchlight Stations.

The ship is equipped with 10 searchlights, 8 of which are for ordnance, the other two being for signaling. All ordnance searchlights are 90 cm. (about 35½ inches) diameter, and the signal searchlights 60 cm. (about 23⅝ inches). The ordnance lights are placed as follows: Three on the foremast on a platform between the upper bridge and the mast control station, these being so placed that the center one can be trained anywhere forward of the beam, and the two wing ones anywhere except directly astern; one on each crane with all-round train; three on the mainmast (two on a lower platform and one on a platform just above this), the two lower ones having an all-round train with the exception of dead ahead, and the upper one being capable of train as far forward as broad on the bow on either side. The two signal searchlights are placed one on either wing of the upper bridge. All searchlights (except the signal lights) are fitted for remote control. All mast lights have voice-tube communication with the forward conning tower, and the mainmast lights have additional communications with the after conning tower and range-finder station. Crane lights have no system of communication other than word of mouth.

Range Finders.

The ship is equipped with six range finders, five of which are the well-known Barr & Strouds, which need no description. These are placed as follows: One 3-meter B. & S. range finder on the upper bridge (main range-finder station); two 2-meter B. & S. range finders in the mast-control station (one on each side; one 2-meter B. & S. range finder in each 10 cm. control station.

The after range finder, placed on the after conning tower, is a 1.5-meter Carl Zeiss, Jena instrument, and is a distinct type, of which very little could be learned by trial. The object is not halved as in our type of range finders, but is always seen complete. There are a number of diamond-shaped spots on the lens, which may be so

adjusted that they show double, and are a greater or less distance apart, according to the distance away of the object at which one is looking. By moving the range scale the dots may be brought into coincidence, and the reading of the scale at this point should seemingly give the range. By trying this out on several objects the distance of which was known, it was found to be greatly in error, although the proportion between the various distances was preserved. It is fitted with various adjusting knobs, and the range scale has several possible positions, so that it is believed that the principle of our trials was correct, but that the adjustments, not being understood, were incorrect. A pamphlet of instructions was found, but no one could be found who understood enough technical German to translate it.

Other Fire-Control Instruments.

The only other instruments relating to fire control found on board, with the exception of some home-made deflection computers, are (1) a mechanical deflection computer built on the sliding rule principle, using as arguments the horizontal components of the relative speed of the target in knots, the horizontal component of the apparent force of the wind, and the range in meters; the instrument is very compact and easily handled, and is fitted with three deflection scales for the various conditions of loading (2) a mechanical time-of-flight indicator consisting of an aluminum case containing a clockwork mechanism, a single dry-cell, and a horn, which so operates that when it is set for a certain caliber of gun and a certain range, and the trigger is pulled as the gun is fired, the horn will be blown electrically at the instant the splash should be seen.

Samples of both of these instruments are being forwarded to the bureau for their inspection.

In addition to the absence of some electrical instruments from the conning tower as already noted, a large electrical instrument is known to have been removed from the mast-control station, and another instrument from the after fire-control station. No hint can be obtained as to the nature of these.

Magazines and Ammunition.

There are 14 magazines aboard these ships, all of which are very accessible, roomy, well arranged (as to stowage), ventilated by electric blowers, cooled by coils from the refrigerating system, fitted with flood clocks operated from the gun deck, sprinkler system, and thermostats. The layout of the magazines is as follows:

1. Forward 30.5-cm. magazine, just forward of No. 1 turret, level of handling room (also contains antiaircraft).
2. Forward 30.5-cm. shell room, just abaft No. 1 turret, same level.
3. Forward 24-cm. magazine and shell room, extends athwartships between 24-cm. handling rooms.

4. Forward 10-cm. magazine, directly under No. 3, same size (also contains antiaircraft).
5. Forward starboard waist 10-cm. magazine, between bunkers, lower platform deck.
6. Forward port waist 10-cm. magazine, between bunkers, lower platform deck.
7. After starboard waist 10-cm. magazine, between bunkers, lower platform deck.
8. After port waist 10-cm. magazine, between bunkers, lower platform deck.
9. After starboard 24-cm. magazine and shell room, around after starboard 24-cm. handling room.
10. After port 24-cm. magazine and shell room, around after port 24-cm. handling room.
11. After starboard 10-cm. magazine, directly under No. 9, same size.
12. After port 10-cm. magazine, directly under No. 10, same size (both No. 11 and No. 12 contain antiaircraft).
13. After 30.5-cm. shell room, just forward of No. 2 turret on level of handling room.
14. After 30.5-cm. magazine, just abaft No. 2 turret, same level (also contains antiaircraft).

All of the magazines are entered through hatches rather than through doors, and in all but the 30.5-cm. (12-inch) magazines and shell rooms trunks lead directly to these hatches from the gun deck. Each magazine is fitted with thermostatic attachments, which, instead of registering only when a certain temperature is reached, will register the temperature at any time desired by plugging in that particular magazine on an indicator on the gun deck. There are two of these indicators—one forward, which takes in the forward six magazines, and one aft, which has connections for the after eight. These thermostatic indicators have been checked with other thermometers in the same magazines and have been found to be very accurate. Of course maximum and minimum mercurial thermometers are also placed in each magazine.

The four waist 10-cm. (4-inch) magazines are very poorly placed. They are built into the wing coal bunkers, and in fact just right into the firerooms, with seemingly nothing but wood lagging between the fireroom bulkhead and the magazine bulkhead. In January, 1919, we experienced a serious oil fire in the fireroom bilges, during which the flames rose as high as the berth deck. About 10 minutes after the fire began the gun-deck indicators showed between 43° and 45° C., and the magazines were flooded, the characteristics and stability of the powder being unknown. Ten minutes later the fire was gotten under control and flooding was stopped. Two of the magazines were found to be completely filled and the other two were full to within a foot of the top.

Ammunition.

Due to the inadequate facilities aboard these ships for breaking down and testing powder charges, projectiles, and fuses no effort was made to do so. No powder-testing apparatus of any description was found aboard.

NOTES ON ITALIAN ORDNANCE.

SOURCE: RELIABLE. **15 November 1919.**

The *Conti di Cavour* recently visited United States ports, calling at Boston, New York, Philadelphia, Annapolis, and Hampton Roads. By previous arrangement the gunnery officer of the *Cavour* held some drills for the writer of these notes.

The *Conti di Cavour* was commissioned in 1914. She carries 12-inch guns in her main battery, arranged in three triple-gun turrets and in two 2-gun turrets. The triple-gun turrets are Nos. 1, 3, and 5, No. 3 being amidships between the two masts, and Nos. 1 and 5 on the forecastle and quarterdeck, respectively. This ship's recent visit to the United States afforded an excellent opportunity of comparing the state of advancement of Italian fire control with the fire control of vessels of the same date in the United States Navy.

Station of Second in Command.

The station of the executive officer is in central station, although the ship is fitted with a secondary ship-control tower in the afterpart of the ship between the afterstack and the after-high turret. This secondary ship-control tower has above it a secondary fire-control tower. There is a small platform about the size of a searchlight platform on each side of the secondary ship-control tower. It is not possible to see directly ahead from this after ship-control station, because of the smokestacks and masts and the forward bridge structure. The solution of the station for the second in command as worked out in new construction in United States ships seems more satisfactory than this station with its poor view ahead. The instruments in the conning tower forward for ship control are duplicated in the after ship-control station.

Masts and Tops.

The two tripod masts are between the two smokestacks and both masts are so close to the smokestacks as to render them untenable for spotting purposes. The foremost in the *Conti di Cavour* is to be moved forward of the forward stack when the ship returns to Italy. Above the level of the smokestacks the masts have been painted black. There are no fire-control tops in this ship. The gunnery officer stated that he would rather do the spotting himself from the fire-control

tower, believing that he, with his experience, could do better than younger officers placed aloft. This conforms with British practice previous to the Battle of Jutland. The British have improved in this matter only by placing their gunnery officer aloft. He still controls the spots in the British service. There are no instruments in the tops on this ship for indicating the bearing of the enemy to the plotting room and turrets, nor any method in the tops of indicating the elevation which should be put on the guns. The combined range finders mounted directly over the forward fire-control tower have a shaft running through the roof of the fire-control tower and carry a pointer so that the fire-control officer may see that the range finders are on the proper bearing. The latest battleships of the Italians, however, the *Duillio* and the *Doria*, have been equipped with one of the most modern systems of follow the pointer in elevation and train operated from aloft. This is the Girardelli synchronous motor system.

Director Fire.

To make clear the difference between the Italian idea of a proper fire control and the idea which we have in the United States Navy, the following statements of the *Cavour's* gunnery officer are given. He said: "You in the United States Navy have a follow the pointer in train, but you have no follow the pointer in elevation. You have only half a director system, whereas we in the Italian Navy, in our later ships, have a complete system, both elevation and train." He said: "Your system of director fire is too slow, because you must wait for the ship to roll 'on,' while with our follow the pointer, our guns are kept elevated all the time and fire in any part of the roll. If the roll is so rapid that our pointers can not keep on, they will fire where the roll is slowest, at the top of the roll."

These remarks of the Italian gunnery officer give one the idea that the training must have all been done in the Adriatic, or in some still water where the roll of the ship was so slight as to enable the gun pointers to follow the pointer operated from the aloft observing station. The gunnery officer did not seem to appreciate the fact that it was impossible for guns to follow the roll. On account of his idea of their apparent superiority over us in the matter of firing in any part of the roll, I thought it might be possible that his turret gun control was of such degree of excellence as to permit his guns following the roll. On account of this, I asked to be allowed to elevate and depress the turret guns, and I found on doing so that their control was no better than ours, in fact it was not so easy for me to keep on with their control as with our own turret control. Their control is the British hydraulic control.

Girardelli System, or Italian Follow-the-Pointer System.

The *Conti di Cavour* has neither a director system nor a follow-the-pointer system. Her installation is one based entirely upon pointer fire for both main and secondary batteries. The range and deflection is sent to the guns by means of step by step visuals, and these are paralleled by voice tubes and telephones. There is a feature in the operation of the visuals in the plotting room following British practice which we might do well to copy. This feature consists of elimination of talking in getting the range off the range keeper to the visual operator.

The officer on the range keeper or plotting board keeps a pointer at the proper range; this operates an indicator at the range and deflection operator's station, so that this range and deflection transmitter gets his information by sight rather than by sound. He keeps his pointer opposite the pointer from the plotting board and in doing so transmits the proper range.

In the later ships, the *Duillio* and the *Doria*, and in the new gun ship, the *Caracciolo*, the Girardelli system of follow the pointer is being installed. While the United States Navy does not agree that a pointer in elevation operated from an aloft position can be continuously followed by the guns, as the Italians are attempting to do in these installations, there is, however, something for us to learn in this Girardelli system, namely, the system is entirely synchronous—that is, the pointers can not be thrown out of step—and in shifting from one control station to another, it is not necessary to stop the whole battery, as is the case with our Sperry system and with the Vickers system, and have all the guns carefully lined up before daring to throw in the transmitter at a new transmitting station. For instance, with the Sperry system if the foretop is shot away, the maintop can not take the control until the maintop transmitter is lined up with all the turrets. With the synchronous system, if the instruments in one turret are temporarily out of commission, that turret can come in on the system at any later moment and its indicating pointers will follow the rest of the system without the necessity of stopping the whole system in order to get the incoming turret lined up. Our Navy is at present working along the same lines, and is endeavoring, as rapidly as possible, to put a synchronous system in our ships.

The reports received from the actual tests in the operation of the Girardelli system are entirely satisfactory. This system was built by an Italian engineer who had before him all that the British had done in their Vickers system, and who set about to improve that system.

Another feature in which their fire control differs from that of the United States Navy is that their follow-the-pointer system is

worked direct from the transmitter in the top to the indicators in the turret stations, there being no break in the system in the plotting room, and no means of transmitting from the plotting room. The United States systems differ from this in that we believe it essential to be able to transmit both bearing and gun angle from instruments in the plotting room in case of accident to instruments aloft.

Torpedoes.

The *Conti di Cavour* is not fitted for firing torpedoes.

3-Inch ex-Caliber for Turret Guns.

Three-inch guns were mounted on all turrets at the forward edge of the turret top for ex-caliber practice.

A ¾-inch rod ran through the turret top connecting the turret gun immediately below with the breech of the 3-inch gun. Where the elevating rod pierces the turret roof a small brass plate, 2½ by 4 inches, through which the rod passes, slides back and forth on a fitting on the roof, covering the hole pierced in the roof. The rod is secured to the slide of the 3-inch gun near the breech, and at this point a slight lateral adjustment is provided for lining up the excaliber gun with the turret gun. The elevating rod may be quickly disconnected from the excaliber gun.

Voice-Tube Receivers.

We may well take a hint from the Italian voice-tube receiver, and in it probably find the solution of voice-tube transmission to turrets. In a room in which there is much noise the Italians have put a hollow brass plug in the end of the voice tube, and have led from this plug a ¼ to ½ inch flexible tube, which branches and fits into earpieces on a head set. The earpieces are quite different from those previously tried in our service. They are small light affairs, which fit to the head neatly. These exclude all extraneous noise, which, after all, is the chief reason why voice tubes in turrets are inefficient.

Dispersion.

The following is the report of the spread in range obtained in a test of the Girardelli system on the battleships *Duillio* and *Doria*, as reported by Mr. S. L. G. Knox, scientific attaché at Rome:

	"Duillio."		"Doria."	
	700	166	120	200
	104	134	200	140
	332	174	140	200
	249	332	680	380
	622	498	1,000	720
	124	630	140	980
Media..	358	318	343	460

Lateral dispersion was negligible.

Ripple Fire.

The primers used are shorter than United States primers and do not always insure an immediate discharge of the powder charges. I was shown their expedient for insuring the discharge of all charges. It consisted of a little circular flat bag of black powder about the size and thickness of the palm of the hand. A goose quill about 2 inches long was firmly attached to the center of this powder bag. On loading, the goose quill was placed in the primer vent in the mushroom head and the black powder thus came against the powder charge when the breech was closed. The primer was strong enough to always set off the black powder, which insured the charges going off uniformly in all guns.

Range Finders.

The largest range finders are 15 feet in length, arranged three in one mount. The turret range finders are only 9 feet in length. The arrangement of all the ships' large range finders on one mount has been followed on the late ships, as well as on the *Conti di Cavour*. This is considered bad practice in the American Navy. The range finders on United States ships are superior to these 15-foot range finders on the Italian ships. The following is the report of an inspection of these range finders, made by Lieut. Commander John H. Magruder, Bureau of Ordnance, inspector of optical instruments:

The primary range-finder station is situated on top of the conning and fire-control tower. The three range finders, which are 15 feet (4.57 meters), Barr & Stroud English-built instruments, are mounted in triplex one above the other on a revolving platform rigidly secured to the top of the conning tower. The installation is similar to the French. There is one trainer for the entire range-finder mount which is turned by hand. His training sight, which is a short periscope of British manufacture, is bore-sighted with the range finders, the range finders themselves having no independent train but can be adjusted for boresighting on the same fore and aft line.

The triplex range-finder mount acts as a target-bearing instrument. I examined the range finders and found them in very good condition. They were not protected from the effects of the rays of the sun except for a very light canopy shed over the top of the instrument, extending approximately two-thirds of the distance out each side from the center. In battle, I was informed that the entire triplex mount was surrounded with canvas to protect the operators from the effect of the blast of the guns and spray. The frames and sockets for this canvas were visible, but the screen was not spread when I observed it. Each of the three range finders had its observer, who made coincidence and at the same time operated the elevating handle. The range was transmitted from each range finder to the plotting room by an electrical transmitter somewhat similar to our Ford type. Commander Ginocchietti said that he had no difficulty with these transmitters getting out of step and that they were accurate to 50 yards. There were voice tubes from each operator to the central station in event of the transmitters carrying away, but normally

these voice tubes were not employed. There was an inside scale, similar to our own, for using in this emergency.

One point that was brought out which is of the greatest importance is that the Italian range-finder personnel are trained for several months on a special range-finder training ship, and the *personnel is permanent.* Also great importance is put on the fact that the men must be kept in training. Not a day elapses that these men do not have to take ranges, with possibly the exception of Sunday and holidays. Commander Ginocchietti believes that this exercise of the range-finder operators is as important for preserving their sharpness of eyesight in making the coincidence as daily toothbrush exercise is for preserving the teeth. Commander Ginocchietti believes that nine-tenths of the performance of range finding lies in the operators. The secondary range-finder station is in the after fire-control tower before mentioned, but consisting of a single Barr & Stroud 9-foot instrument.

Target Practice.

I noticed on board two types of explosive shell, one the armor-piercing projectile, the other high-capacity explosive. A target practice, the commander informed me, was conducted with high-capacity explosives which burst on impact. He stated that the Italian Government allowed them at least one practice a year with this type of shell and he recommended it as essential in that the results were so different from that obtained with the target-practice projectile. He referred particularly to the effect on the fire control in that the burst was different and the splash obscured the target and was so different from the clean-cut splash obtained with the blind projectile in estimating the fall of the shot.

Whilst on the *Mississippi* in Cuba and conducting experimental firing, armor-piercing projectiles were used, but as these did not explode on contact there was very little difference in the appearance from the target-practice projectile. It is recommended that in case a target practice with high-capacity projectiles of the above nature has not already been conducted by the department that it would be well worth while to conduct one such practice to see the effect on the fire control.

OPERATIONS.

FIELD MARSHAL SIR DOUGLAS HAIG ON THE "FEATURES OF THE WAR."

Source Reliable.

8 April 1919.

(This article though not confidential, is, because of its great interest, published for the information of the service.)

In this, my final dispatch, I think it desirable to comment briefly upon certain general features which concern the whole series of operations carried out under my command. I am urged thereto by the conviction that neither the course of the war itself nor the military lessons to be drawn therefrom can properly be comprehended unless the long succession of battles commenced on the Somme in 1916 and ended in November of last year on the Sambre are viewed as forming part of one great and continuous engagement.

To direct attention to any single phase of that stupendous and incessent struggle and seek in it the explanation of our success, to the exclusion or neglect of other phases possibly less striking in their immediate or obvious consequences, is, in my opinion, to risk the formation of unsound doctrines regarding the character and requirements of modern war.

If the operations of the past four and a half years are regarded as a single continuous campaign, there can be recognized in them the same general features and the same necessary stages which between forces of approximately equal strength have marked all the conclusive battles of history. There is in the first instance the preliminary stage of the campaign in which the opposing forces seek to deploy and maneuver for position, endeavoring while doing so to gain some early advantage which might be pushed home to quick decision. This phase came to an end in the present war with the creation of continuous trench lines from the Swiss frontier to the sea.

Battle having been joined, there follows the period of real struggle in which the main forces of the two belligerent armies are pitted against each other in close and costly combat. Each commander seeks to tear down the power of resistance of his opponent and to pin him to his position, while preserving or accumulating in his own hands a powerful reserve force with which he can maneuver, and when signs of the enemy becoming morally and physically weakened

are observed, deliver the decisive attack. The greatest possible pressure against the enemy's whole front must be maintained, especially when the crisis of the battle approaches. Then every man, horse, and gun is required to cooperate, so as to complete the enemy's overthrow and exploit success.

In the stage of the wearing-out struggle losses will necessarily be heavy on both sides, for in it the price of victory is paid. If the opposing forces are approximately equal in numbers, in courage, in morale, and in equipment, there is no way of avoiding payment of the price or of eliminating this phase of the struggle.

In former battles this stage of the conflict has rarely lasted more than a few days, and has often been completed in a few hours. When armies of millions are engaged, with the resources of great empires behind them, it will inevitably be long. It will include violent crises of fighting which, when viewed separately and apart from the general perspective, will appear individually as great indecisive battles. To this stage belong the great engagements of 1916 and 1917 which wore down the strength of the German armies.

Finally, whether from the superior fighting ability and leadership of one of the belligerents, as the result of greater resources of tenacity, or by reason of higher morale, or from a combination of all these causes, the time will come when the other side will begin to weaken and the climax of the battle is reached. Then the commander of the weaker side must choose whether he will break off the engagement, if he can, while there is yet time, or stake on a supreme effort what reserves remain to him. The launching and destruction of Napoleon's last reserves at Waterloo was a matter of minutes. In this World War the great sortie of the beleaguered German armies commenced on 21 March, 1918, and lasted for four months, yet it represents a corresponding stage in a single colossal battle.

The breaking down of such a supreme effort will be the signal for the commander of the successful side to develop his greatest strength and seek to turn to immediate account the loss in material and morale which their failure must inevitably produce among his opponent's troops. In a battle joined and decided in the course of a few days or hours, there is no risk that the lay observer will seek to distinguish the culminating operations by which victory is seized and exploited from the preceding stages by which it has been made possible and determined. If the whole operations of the present war are regarded in correct perspective, the victories of the summer and autumn of 1918 will be seen to be as directly dependent upon the two years of stubborn fighting that preceded them.

If the causes which determined the length of the recent contest are examined in the light of the accepted principles of war, it will

be seen that the duration of the struggle was governed by and bore a direct relation to certain definite factors which are enumerated below.

In the first place, we were unprepared for war, or, at any rate, for a war of such magnitude. We were deficient in both trained men and military material, and, what was more important, had no machinery ready by which either men or material could be produced in anything approaching the requisite quantities. The consequences were twofold. Firstly, the necessary machinery had to be improvised hurriedly, and improvisation is never economical and seldom satisfactory. In this case the high-water mark of our fighting strength in infantry was only reached after two and a half years of conflict, by which time heavy casualties had already been incurred. In consequence, the full man power of the Empire was never developed in the field at any period of the war.

As regards material, it was not until midsummer, 1916, that the artillery situation became even approximately adequate to the conduct of major operations. Throughout the Somme Battle the expenditure of artillery ammunition had to be watched with the greatest care. During the battles of 1917 ammunition was plentiful but the gun situation was a source of constant anxiety. Only in 1918 was it possible to conduct artillery operations independently of any limiting consideration other than that of transport.

The second consequence of our unpreparedness was that our armies were unable to intervene, either at the outset of the war or until nearly two years had elapsed, in sufficient strength adequately to assist our Allies. The enemy was able to gain a notable initial advantage by establishing himself in Belgium and northern France and throughout the early stages of the war was free to concentrate an undue proportion of his effectives against France and Russia. The excessive burden thrown upon the gallant army of France during this period caused them losses the effect of which has been felt all through the war and directly influenced its length. Just as at no time were we as an Empire able to put our own full strength into the field, so at no time were the Allies as a whole able completely to develop and obtain the full effect from their greatly superior man power. What might have been the effect of British intervention on a larger scale in the earlier stages of the war is shown by what was actually achieved by our original expeditionary force.

It is interesting to note that in previous campaigns the side which has been fully prepared for war has almost invariably gained a rapid and complete success over its less well prepared opponent. In 1866 and 1870 Austria, and then France, were overwhelmed at the outset by means of superior preparations. The initial advantages

derived therefrom were followed up by such vigorous and ruthless action, regardless of loss, that there was no time to recover from the first stunning blows. The German plan of campaign in the present war was undoubtedly based on similar principles. The margin by which the German onrush in 1914 was stemmed was so narrow and the subsequent struggle so severe that the word "miraculous" is hardly too strong a term to describe the recovery and ultimate victory of the Allies.

A further cause adversely influencing the duration of the war on the western front during its later stages, and one following indirectly from that just stated, was the situation in other theaters. The military strength of Russia broke down in 1917 at a critical period, when, had she been able to carry out her military engagements, the war might have been shortened by a year. At a later date, the military situation in Italy in the autumn of 1917 necessitated the transfer of five British divisions from France to Italy, at a time when their presence in France might have had far-reaching effects.

Thirdly, the Allies were handicapped in their task and the war thereby lengthened by the inherent difficulties always associated with the combined action of armies of separate nationalities, differing in speech and temperament, and, not least important, in military organization, equipment, and supply.

Finally, as indicated in the opening paragraph of this part of my dispatch, the huge numbers of men engaged on either side, whereby a continuous battle front was rapidly established from Switzerland to the sea, outflanking was made impossible and maneuver very difficult, necessitating the delivery of frontal attacks. This factor, combined with the strength of the defensive under modern conditions, rendered a protracted wearing-out battle unavoidable before the enemy's power of resistance could be overcome. So long as the opposing forces are at the outset approximately equal in numbers and morale, and there are no flanks to turn, a long struggle for supremacy is inevitable.

Obviously, the greater the length of a war the higher is likely to be the number of casualties incurred in it on either side. The same causes therefore, which served to protract the recent struggle are largely responsible for the extent of our casualties. There can be no question that to our general unpreparedness must be attributed the loss of many thousands of brave men whose sacrifice we deeply deplore, while we regard their splendid gallantry and selfdevotion with unstinted admiration and gratitude.

Given, however, the military situation existing in August, 1914, our total losses in the war have been no larger than were to be expected. Neither do they compare unfavorably with those of any other of the belligerent nations, so far as figures are available, from

which comparison can be made. The total British casualties in all theaters of war, killed, wounded, missing, and prisoners, including native troops, are approximately three millions (3,076,388). Of this total some two and a half millions (2,568,834) were incurred on the western front. The total French losses, killed, missing, and prisoners, but exclusive of wounded, have been given officially as approximately 1,831,000. If an estimate for wounded is added, the total can scarcely be less than 4,800.000, and of this total it is fair to assume that over 4,000,000 were incurred on the western front. The published figures for Italy killed and wounded only, exclusive of prisoners, amount to 1,400,000, of which practically the whole were incurred in the western theater of war.

Figures have also been published for Germany and Austria. The total German casualties, killed, wounded, missing, and prisoners, are given at approximately six and a half millions (6,485,000), of which the vastly greater proportion must have been incurred on the western front, where the bulk of the German forces were concentrated and the hardest fighting took place. In view of the fact, however, that the number of German prisoners is definitely known to be considerably understated, these figures must be accepted with reserve. The losses of Austria-Hungary in killed, missing, and prisoners are given as approximately two and three-quarter millions (2,772,000). An estimate of wounded would give a total of over four and a half millions.

The extent of our casualties, like the duration of the war, was dependent on certain definite factors which can be stated shortly.

In the first place, the military situation compelled us, particularly during the first portion of the war, to make great efforts before we had developed our full strength in the field or properly equipped and trained our armies. These efforts were wasteful of men, but in the circumstances they could not be avoided. The only alternative was to do nothing and see our French allies overwhelmed by the enemy's superior numbers.

During the second half of the war, and that part embracing the critical and costly period of the wearing out battle, the losses previously suffered by our allies laid upon the British armies in France an increasing share in the burden of attack. From the opening of the Somme Battle, in 1916, to the termination of hostilities the British armies were subjected to a strain of the utmost severity which never ceased, and consequently had little or no opportunity for the rest and training they so greatly needed.

In addition to these particular considerations, certain general factors peculiar to modern war made for the inflation of losses. The great strength of modern field defenses and the power and precision of modern weapons, the multiplication of machine guns,

trench mortars, and artillery of all natures, the employment of gas, and the rapid development of the aeroplane as a formidable agent of destruction against both men and material, all combined to increase the price to be paid for victory.

If only for these reasons, no comparisons can usefully be made between the relative losses incurred in this war and any previous war. There is, however, the further consideration that the issues involved in this stupendous struggle were far greater than those concerned in any other war in recent history. Our existence as an Empire and civilization itself, as it is understood by the free western nations, were at stake. Men fought as they have never fought before, in masses.

Despite our own particular handicaps and the foregoing general considerations, it is satisfactory to note that as the result of the courage and determination of our troops, and the high level of leadership generally maintained, our losses even in attack over the whole period of the battle compare favorably with those inflicted on our opponents.

The approximate total of our battle casualties in all arms, and including overseas troops, from the commencement of the Somme Battle in 1916 to the conclusion of the armistice is 2,140,000. The calculation of German losses is obviously a matter of great difficulty. It is estimated, however, that the number of casualties inflicted on the enemy by British troops during the above period exceeds two and a half millions. It is of interest, moreover, in the light of the paragraph next following, that more than half the total casualties incurred by us in the fighting of 1918 were occasioned during the five months, March–July, when our armies were on the defense.

Closely connected with the question of casualties is that of the relative values of attack and defense. It is a view often expressed that the attack is more expensive than defense. This is only a half statement of the truth. Unquestionably, unsuccessful attack is generally more expensive than defense, particularly if the attack is pressed home with courage and resolution. On the other hand, attack so pressed home, if skillfully conducted, is rarely unsuccessful, whereas in its later stages especially, unsuccessful defense is far more costly than attack.

Moreover, the object of all war is victory, and a purely defensive attitude can never bring about a successful decision, either in a battle or in a campaign. The idea that a war can be won by standing on the defensive and waiting for the enemy to attack is a dangerous fallacy, which owes its inception to the desire to evade the price of victory. It is an axiom that decisive success in battle can be gained only by a vigorous offensive. The principle here stated has long been recognized as being fundamental and is based on the universal teaching of

military history in all ages. The course of the present war has proved it to be correct.

To pass for a moment from the general to the particular and consider in the light of the present war the facts upon which this axiom is based.

A defensive rôle sooner or later brings about a distinct lowering of the morale of the troops, who imagine that the enemy must be the better man, or, at least, more numerous, better equipped with and better served by artillery or other mechanical aids to victory. Once the mass of the defending infantry become possessed of such ideas the battle is as good as lost. An army fighting on enemy soil, especially if its standard of discipline is high, may maintain a successful defense for a protracted period in the hope that victory may be gained elsewhere or that the enemy may tire or weaken in his resolution and accept a compromise. The resistance of the German armies was undoubtedly prolonged in this fashion, but in the end the persistence of our troops had its natural effect.

Further, a defensive policy involves the loss of the initiative, with all the consequent disadvantages to the defender. The enemy is able to choose at his own convenience the time and place of his attacks. Not being influenced himself by the threat of attack from his opponent, he can afford to take risks, and by greatly weakening his front in some places can concentrate an overwhelming force elsewhere with which to attack. The defender, on the other hand, becomes almost entirely ignorant of the dispositions and plans of his opponent, who is thus in a position to effect a surprise. This was clearly exemplified during the fighting of 1918. As long as the enemy was attacking he obtained fairly full information regarding our dispositions. Captured documents show that as soon as he was thrown once more on the defensive, and the initiative returned to the Allies, he was kept in comparative ignorance of our plans and dispositions. The consequence was that the Allies were able to effect many surprises, both strategic and tactical.

As a further effect of the loss of the initiative and ignorance of his opponent's intentions, the defender finds it difficult to avoid a certain dispersal of his forces. Though for a variety of reasons, including the fact that we had lately been on the offensive, we were by no means entirely ignorant of the enemy's intentions in the spring of 1918, the unavoidable uncertainty resulting from a temporary loss of the initiative did have the effect of preventing a complete concentration of our reserves behind the point of the enemy's attack.

An additional reason, peculiar to the circumstances of the present war, which in itself compelled me to refuse to adopt a purely defensive attitude so long as any other was open to me, is to be found in the geographical position of our armies. For reasons stated by

me in my dispatch of July 20, 1918, we could not afford to give much ground on any part of our front. The experience of the war has shown that if the defense is to be maintained successfully, even for a limited time, it must be flexible.

If the views set out by me in the preceding paragraphs are accepted, it will be recognized that the war did not follow any unprecedented course, and that its end was neither sudden nor should it have been unexpected. The rapid collapse of Germany's military powers in the latter half of 1918 was the logical outcome of the fighting of the previous years. It would not have taken place but for that period of ceaseless attrition which used up the reserves of the German armies, while the constant and growing pressure of the blockade sapped with more deadly insistence from year to year at the strength and resolution of the German people. It is the great battles of 1916 and 1917 that we have to seek for the secret of our victory in 1918.

Doubtless, the end might have come sooner had we been able to develop the military resources of our Empire more rapidly and with a higher degree of concentration, or had not the defection of Russia in 1917 given our enemies a new lease of life.

So far as the military situation is concerned, in spite of the great accession of the strength which Germany received as the result of the defection of Russia, the battles of 1916 and 1917 had so far weakened her armies that the effort they made in 1918 was insufficient to secure victory. Moreover, the effect of the battles of 1916 and 1917 was not confined to loss of German man power. The moral effects of those battles were enormous, both in the German army and in Germany. By their means our soldiers established over the German soldier a moral superiority which they held in an ever-increasing degree until the end of the war, even in the difficult days of March and April, 1918.

From time to time as the war of position dragged on and the enemy's trench systems remained unbroken, while questions of man power and the shortage of shipping became acute, the wisdom or necessity of maintaining any large force of mounted men was freely discussed. In the light of the full experience of the war the decision to preserve the cavalry corps has been completely justified. It has been proved that cavalry, whether used for shock effect under suitable conditions or as mobile infantry, have still an indispensable part to play in modern war. Moreover, it can not safely be assumed that in all future wars the flanks of the opposing forces will rest on neutral States or impassable obstacles. Whenever such a condition does not obtain, opportunities for the use of cavalry must arise frequently.

Throughout the great retirement in 1914 our cavalry covered the retirement and protected the flanks of our columns against the on-

rush of the enemy, and on frequent occasions prevented our infantry from being overrun by the enemy's cavalry. Later in the same year, at Ypres, their mobility multiplied their value as a reserve, enabling them rapidly to reinforce threatened portions of our line.

During the critical period of position warfare, when the trial and strength between the opposing forces took place, the absence of room to maneuver made the importance of cavalry less apparent. Even under such conditions, however, valuable results may be expected from the employment of a strong force of cavalry when, after there has been severe fighting on one or more fronts, a surprise attack is made on another front. Such an occasion arose in the operations before Cambrai at the close of 1917, when the cavalry were of the greatest service; while throughout the whole period of trench fighting they constituted an important mobile reserve.

At a later date, when circumstances found us operating once more in comparatively open country, cavalry proved themselves of value in their true rôle. During the German offensive in March, 1918, the superior mobility of cavalry fully justified their existence. At the commencement of the battle cavalry were used under the fifth army over wide fronts. So great, indeed, became the need for mounted men that certain units which had but recently been dismounted were hurriedly provided with horses and did splendid service. Frequently, when it was impossible to move forward other troops in time, our mounted troops were able to fill gaps in our line and restore the situation. The absence of hostile cavalry at this period was a marked feature of the battle. Had the German command had at their disposal even two or three well-trained cavalry divisions, a wedge might have been driven between the French and British armies. Their presence could not have failed to have added greatly to the difficulties of our task.

In the actions already referred to east of Amiens, the cavalry were again able to demonstrate the great advantage which their power of rapid concentration gives them in a surprise attack. Operating in close concert with both armored cars and infantry, they pushed ahead of the latter and by anticipating the arrival of German reserves assisted materially in our success. In the battle of October 8 they were responsible for saving the Cambrai-Le Cateau-St. Quentin Railway from complete destruction. Finally, during the culminating operations of the war when the German armies were falling back in disorganized masses a new situation arose which demanded the use of mounted troops. Then our cavalry, pressing hard upon the enemy's heels, hastened his retreat and threw him into worse confusion. At such a time the moral effect of cavalry is overwhelming and is in itself a sufficient reason for the retention of that arm.

On the morning of the armistice, two British cavalry divisions were on the march east of the Scheldt, and before the orders to stop reached them they had already gained a line 10 miles in front of our infantry outposts. There is no doubt that had the advance of the cavalry been allowed to continue the enemy's disorganized retreat would have been turned into a rout.

A remarkable feature of the present war has been the number and variety of mechanical contrivances to which it has given birth or has brought to a higher state of perfection.

Besides the great increase in mobility made possible by the development of motor transport, heavy artillery, trench mortars, machine guns, aeroplanes, tanks, gas, and barbed wire have in their several spheres of action played very prominent parts in operations, and as a whole have given a greater driving power to war. The belligerent possessing a preponderance of such mechanical contrivances has found himself in a very favorable position as compared with his less well provided opponent. The general superiority of the Allies in this direction during the concluding stages of the recent struggle undoubtedly contributed powerfully to their success. In this respect the Army owes a great debt to science and to the distinguished scientific men who placed their learning and skill at the disposal of their country.

It should never be forgotten, however, that weapons of this character are incapable of effective independent action. They do not in themselves possess the power to obtain a decision, their real function being to assist the infantry to get to grips with the opponents. To place in them a reliance out of proportion to their real utility, to imagine for example, that tanks and aeroplanes can take the place of infantry and artillery, would be to do a disservice to those who have the future of these new weapons most at heart by robbing them of the power to use them to their best effect.

Every mechanical device so far produced is dependent for its best effective upon the closest possible association with other arms, and in particular with infantry and artillery. Aeroplanes must rely upon infantry to prevent the enemy from overrunning their aerodromes, and, despite their increasing range and versatility of action, are clearly incapable in themselves of bringing about a decision. Tanks require the closest artillery support to enable them to reach their objectives without falling victims to the enemy's artillery, and are dependent upon the infantry to hold the position they have won.

As an instance of the interdependence of artillery and tanks, we may take the actions fought east of Amiens on August 8, 1918, and following days. A very large number of tanks were employed in these operations and they carried out their tasks in the most brilliant

manner. Yet a scrutiny of the artillery ammunition returns for this period discloses the fact that in no action of similar dimensions had the expenditures of ammunition been so great.

Immense as the influence of mechanical devices may be, they can not by themselves decide a campaign. Their true rôle is that of assisting the infantryman, which they have done in a most admirable manner. They can not replace him. Only by the rifle and bayonet of the infantryman can the decisive victory be won.

This war has given no new principles; but the different mechanical appliances above mentioned—and in particular the rapid improvement and multiplication of aeroplanes, the use of immense number of machine guns and Lewis guns, the employment of vast quantities of barbed wire as effective obstacles, the enormous expansion of artillery, and the provision of great masses of motor transport—have introduced new problems of considerable complexity concerning the effective cooperation of the different arms and services. Much thought has had to be bestowed upon determining how new devices could be combined in the best manner with the machinery already working.

The development of the air service is a matter of general knowledge, and figures showing something of the work done by our airmen were included in my last dispatch. The combining of their operations with those of the other arms, and particularly of the artillery, has been the subject of constant study and experiment, giving results of the very highest value. As regards machine guns, from a proportion of 1 gun to approximately 500 infantrymen in 1914, our establishment of machine guns and Lewis guns had risen at the end of 1918 to 1 machine gun or Lewis gun to approximately 20 infantrymen. This great expansion was necessarily accompanied by a modification of training and methods both for attack and defense, and resulted ultimately in the establishment of the machine-gun corps under an inspector general.

During the same period the growth of our artillery was even more remarkable, its numbers and power increasing out of all proportion to the experience of previous wars. The 486 pieces of light and medium artillery with which we took the field in August, 1914, were represented at the date of the armistice by 6,437 guns and howitzers of all natures, including pieces of the heaviest caliber.

This vast increase so profoundly influenced the employment of artillery and was accompanied by so intimate an association with other arms and services that it merits special comment.

In the first place, big changes were required in artillery organization, as well as important decisions, concerning the proportions in which the different natures of artillery and artillery ammunition should be manufactured. These changes and decisions were made

during 1916, and resulted in the existing artillery organization of the British armies in France.

In order to gain the elasticity essential to the quick concentration of guns at the decisive point, to enable the best use to be made of them, and to facilitate ammunition supply and fire control, artillery commanders, acting under army and corps commanders, were introduced, and staffs provided for them. This enabled the large concentrations of guns required for our offensives to be quickly absorbed and efficiently directed. The proportions required of guns to howitzers and of the lighter to the heavier natures were determined by certain factors, namely, the problem of siting in the comparatively limited areas available the great numbers of pieces required for an offensive; the "lives" of the different types of guns and howitzers—that is, the number of rounds which can be fired from them before they become unserviceable from wear—and questions of relative accuracy and fire effect upon particular kinds of targets.

The results attained by the organization established in 1916 is in itself strong evidence of the soundness of the principles upon which it was based. It made possible a high degree of elasticity, and by the full and successful exploitation of all the means placed at its disposal by science and experience, insured that the continuous artillery battle which began on the Somme should culminate, as it did, in the defeat of the enemy's guns.

The great development of air photography, sound ranging, flash spotting, air-burst ranging, and aerial observation brought counter-battery work and harassing fire both by day and night to a high state of perfection. Special progress was made in the art of engaging moving targets with fire controlled by observation from aeroplanes and balloons. The work of the field-survey sections in the location of hostile battery positions by resection and the employment of accurate maps was brought into extended use. In combination with the work of the calibration sections in the accurate calibration of guns and by careful calculation of corrections of range required to compensate for weather conditions it became possible to a large extent to dispense with registration, whereby the chance of effecting surprise was greatly increased. In the operations east of Amiens on 8 August, 1918, in which over 2,000 guns were employed, practically the whole of the batteries concentrated for the purposes of the attack opened fire for the first time on the actual morning of the assault.

The use of smoke shell for covering the advance of our infantry and masking the enemy's positions was introduced and employed with increasing frequency and effect. New forms of gas shell were made available, and their combination with the infantry attack carefully studied. The invention of a new fuse known as "106," which

was first used in the Battle of Arras, 1917, enabled wire entanglements to be easily and quickly destroyed, and so modified our methods of attacking organized positions. By bursting the shell the instant it touched the ground and before it had become buried, the destructive effect of the explosion was greatly increased. It became possible to cut wire with a far less expenditure of time and ammunition, and the factor of surprise was given a larger part in operations.

Great attention was paid to the training of personnel and in particular the Chapperton Down Artillery School, Salisbury Plain, was formed for training artillery brigade commanders and battery commanders, while artillery schools in France were organized for the training of subalterns and noncommissioned officers.

A short examination of our principal attacks will give a good idea of the increasing importance of artillery. On the first day of the Somme Battle of 1916 the number of artillery personnel engaged was equal to about half the infantry strength of the attacking divisions. On this one day a total of nearly 13,000 tons of artillery ammunition was fired by us on the western front. Our attacks at Arras and Messines on April 9 and June 7, 1917, saw the total expenditure of artillery ammunition nearly doubled on the first days of those battles, while the proportion of artillery personnel to infantry steadily grew.

During the period following the opening of the Somme Battle the predominance of our artillery over that of the enemy gradually increased till at the time of the Arras Battle it had reached a maximum. In the course of the summer and autumn of 1917, however, the enemy constantly reenforced his artillery on our front, being enabled to do so owing to the relaxation of pressure elsewhere.

The Battle of Ypres, in the autumn of 1917, was one of intense struggle for artillery supremacy. By dint of reducing his artillery strength on other parts of the western front, and by bringing guns from the east, the enemy definitely challenged the predominance of our artillery. In this battle, therefore, the proportion of our artillery to infantry strength was particularly large. In the opening attack on July 31 our artillery personnel amounted to over 80 per cent of the infantry engaged in the principal attack on our front, and our total expenditure of artillery ammunition on this day exceeded 23,000 tons. During the succeeding weeks the battle of the rival artilleries became ever more violent. On the two days, September 20 and 21, about 42,000 tons of artillery ammunition were expended by us, and in the successful attack of October 4, which gave us the main ridge about Broodseinde, our artillery personnel amounted to 85 per cent of the infantry engaged in the assault.

During the winter of 1917–18 the enemy so greatly added to his artillery strength by batteries brought from the Russian front that

in his spring offensive he was able temporarily to effect a definite local artillery superiority. This state of affairs was short lived. Even before the breakdown of the German offensive our guns had regained the upper hand. In the battles later in the year the superiority of our batteries once more grew rapidly, until the defeat of the German artillery became an accomplished fact. From the commencement of our offensive in August, 1918, to the conclusion of the armistice, some 700,000 tons of artillery ammunition were expended by the British armies on the western front. For the fortnight from August 21 to September 3 our average daily expenditure exceeded 11,000 tons, while for the three days of crucial battle on the 27th, 28th, and 29th of September nearly 65,000 tons of ammunition were fired by our artillery.

The tremendous growth of our artillery strength above described followed inevitably from the character of the wearing-out battle upon which we were engaged. The restricted opportunities for maneuver and the necessity for frontal attacks made the employment of great masses of artillery essential.

The massing of the guns alone, however, could not have secured success without the closest possible combination between our batteries and the infantry they were called upon to support as well as with the other arms. The expansion was accompanied, therefore, by a constant endeavor to improve the knowledge of all ranks of both artillery and infantry and the air service concerning the work and possibilities of the other arms.

An intelligent understanding of "the other man's job" is the first essential of successful cooperation. To obtain the best results from the vast and complex machine composing a modern army, deep study of work other than one's own is necessary for all arms. For this study much time is needed, as well as much practical application of the principles evolved, and for reasons already explained opportunity sufficient for adequate training could not be found. None the less, the best possible use was made of such opportunities as offered and much was in fact accomplished.

As a natural corollary to the general increase of our forces, the signal service, required alike for the proper coordination of the supply and for the direction and control of the battle, has grown almost out of recognition. From an original establishment of under 2,400 officers and men, trained and equipped chiefly for mobile warfare, at the end of 1918 the personnel of the signal service had risen to 42,000, fully equipped with all the latest devices of modern science to act efficiently under all conditions as the nervous system to the whole vast organism of our Army.

The commencement of trench warfare and the greater use of artillery led to a rapid development of the signal system, which,

as fresh units was introduced, became more and more elaborate. At the same time, the increase in the power and range of artillery made the maintenance of communications constantly more difficult. Many miles of deep trenches were dug in which cables containing 50 to 100 circuits were buried to gain protection from shell fire. The use of wireless communication gradually became more widely spread and finally constituted part of the signal establishment of all formations down to divisions. To provide an alternative method of communication with front-line troops, in 1915 carrier pigeons were introduced and a special branch of the signal service was formed, controlling ultimately some 20,000 birds. In 1917 a messenger-dog service was started for similar purposes and did good work on a number of occasions.

The expansion of the work of the signal service in the more forward areas was accompanied by a similar development on the lines of communication, at general headquarters, armies, and corps. Construction and railway companies were formed and about 1,500 miles of main telegraph and telephone routes constructed in the line of communication area alone, in addition to many miles in Army areas. Provision had to be made for communicating with London, Paris, and Marseille, as well as between the different allied headquarters. On the advance of our forces to the Rhine telephone communication was established between general headquarters at Montreuil and Cologne. Signal communication entailing the putting up of many thousands of miles of wire was provided also for the control of railway traffic, while to supplement electric communication generally a dispatch-rider letter service was maintained by motor cyclists.

The amount of signal traffic dealt with became very great, and on the lines of communication alone more than 23,000 telegrams have been transmitted in 24 hours. Similarly, at general headquarters as many as 9,000 telegrams have been dealt with in 24 hours, besides 3,400 letters carried by dispatch riders; and Army headquarters has handled 10,000 telegrams and 5,000 letters in the same space of time, and a corps 4,500 telegrams and 3,000 letters. In addition to telegrams and letters, there has been at all times a great volume of telephone traffic.

Something of the extent of the constructional work required, in particular to meet the constant changes of the battle line and the movement of headquarters, can be gathered from the fact that as many as 6,500 miles of field cable have been issued in a single week. The average weekly issue of such cable for the whole of 1918 was approximately 3,300 miles.

The immense expansion of the Army from 6 to over 60 infantry divisions, combined with the constant mutiplication of auxiliary arms, called inevitably for a large increase in the size and scope of the

services concerned in the supply and maintenance of our fighting forces.

As the Army grew and became more complicated the total feeding strength of our forces in France rose until it approached a total of 2,700,000 men. The vastness of the figures involved in providing for their needs will be realized from the following examples: For the maintenance of a single division for one day, nearly 200 tons dead-weight of supplies and stores are needed, representing a shipping tonnage of nearly 450 tons. In an army of 2,700,000 men, the addition of 1 ounce to each man's daily rations involves the carrying of an extra 75 tons of goods.

To cope with so great a growth, the number of existing directorates had gradually to be added to or their duties extended, with a corresponding increase in demands for personnel. The supervision of ports was intrusted to the directorate of docks, which controlled special companies for the transshipping of stores. By the end of November, 1918, the number of individual landings in France at the various ports managed by us exceeded 10½ million persons. During the 11 months, January to November, 1918, the tonnage landed at these ports averaged some 175,000 per week.

To the directorate of transport, originally concerned with the administration of horse vehicles and pack animals, fell the further duty of exploiting mechanical road traction. Despite the employment of over 46,700 motor vehicles, including over 30,000 lorries, the number of horses and mules rose greatly, reaching a figure exceeding 400,000. The replacement, training, and distribution of these animals was the duty of directorate of remounts. The directorate of veterinary services reduced losses and prevented the spread of disease, while the inspector of horse feeding and economies insured that the utmost value was obtained from the forage and grain consumed.

To meet the requirements of mechanical and horse traffic, the upkeep or construction of a maximum of some 4,500 miles of roadway was intrusted to the directorate of roads. Some idea of the work involved may be obtained from the fact that for ordinary upkeep alone 100 tons of road material are required per fortnight for the maintenance of 1 mile of road. Under this directorate were organized a number of road construction companies, together with quarry companies to supply the necessary metal. In the month of October, 1918, over 85,000 tons of road material were conveyed weekly by motor transport alone, involving a petrol mileage of over 14,000,000 weekly. The total output of stone from the commencement of 1918 to the date of the armistice amounted to some 3,500,000 tons.

For the working of the existing railways and for the construction or repair of many miles of track, both normal and narrow gauge, railway troops of every description, operating companies, construction companies, survey and reconnoissance companies, engine-crew companies, workshop companies, wagon-erecting companies, and light railway forward companies had to be provided. Under the directorate of railway traffic, the directorate of construction, and the directorate of light railways, these and other technical troops during 1918 built or reconstructed 2,340 miles of broad-gauge and 1,348 miles of narrow-gauge railway. Throughout the whole period of their operation they guaranteed the smooth and efficient working of the railway system. In the six months—May to October, 1918—a weekly average load of approximately 400,000 tons, while a further 130,000 tons were carried weekly by our light railways. The number of locomotives imported to deal with this traffic rose from 62 in 1916 to over 1,200 by the end of 1918, while the number of trucks rose from 3,840 to 52,600.

The inland water transport section was organized under a separate directorate for the working in France and Flanders of the canal and cross-channel barge traffic. On inland waterways alone an average of 56,000 tons of material were carried during 1918, the extent of waterways worked by us at the date of the armistice being some 465 miles.

The wonderful development of all methods of transportation had an important influence upon the course of events. No war has been fought with such ample means of quick transportation as were available during the recent struggle. Despite the huge increase in the size of armies it was possible to effect great concentrations of troops with a speed which, having regard to the numbers of men and bulk of material moved, has never before been equaled. Strategic and tactical mobility has been the guiding principle of our transportation arrangements; but this was itself at all times vitally affected by questions of supply and by the necessity of providing for the evacuation and replacement on a vast scale of the sick and wounded.

The successful coordination and economic use of all the various kinds of transportation requires most systematic management, based on deep thought and previous experience. So great was the work entailed in the handling of the vast quantities of which some few examples are given above, so complex did the machinery of transport become and so important was it that the highest state of efficiency should be maintained, that in the autumn of 1916 I was forced to adopt an entirely new system for running our lines of communication. The appointment of inspector general of communications was abolished and the services previously directed by that officer were

brought under the immediate control of The Adjutant General, the Quartermaster General, and the Director General of Transportation. The last-mentioned was a new office created with a separate staff composed for the greater part of civilian experts to deal specifically with transportation questions. At the same time the command and administration of the troops on the lines of communication were vested in a "general officer commanding the lines of communication area."

The huge bulk of the supplies to be handled was due not merely to the size of our Army. It arose also from the introduction of new weapons and methods of war, and from the establishment of a higher standard of comfort for the troops. The incessant demands of the fighting forces for munitions were supplied by the directorate of ordnance services, combined with a great expansion of ordnance workshops; while the directorate of engineering stores provided on a vast scale the materials required for the construction of trench defenses and kindred purposes. For the comfort and well-being of the troops, the directorate of supplies stored and distributed in sound condition fresh food, to take the place as far as possible of tinned rations. Through the agency of an inspectorate of messing and economies, regular schools of cookery gave instruction to nearly 25,000 cooks, and careful measures were taken for the recovery of kitchen by-products. In August, 1918, over 860,000 pounds of dripping were received from armies and consigned to England, while the cash value of the by-products disposed of from all sources has exceeded £60,000 in a single month. Provision was made for baths, a new inspectorate supervised the running of army laundries on up-to-date lines.

The expeditionary force canteens made it possible to obtain additional comforts close up to the front. During 1918, the value of the weekly sales in the different canteens averaged 8,500,000 francs. These canteens were valuably supplemented by the various voluntary institutions ministering to the comfort and recreation of our troops, such as the Y. M. C. A., the Church Army, the Scottish Churches Huts, the Salvation Army, the Soldiers' Christian Association, the Catholic Women's League and Club Huts, the United Army and Navy Board, the Wesleyan Soldiers' Institute, and the British Soldiers' Institute. In many cases these organizations carried on their work almost in the actual fighting line, and did much to maintain the high morale of our armies. To permit the troops to avail themselves of the opportunities so offered, methods devised by the paymaster in chief enabled soldiers to obtain money anywhere in the field. Parcels and letters from home have been delivered by the Army Postal Service with remarkable regularity.

As the effects of the enemy submarine warfare began to be felt and the shortage of shipping became more and more acute, so it became increasingly necessary for the army in France to be more self-supporting. To meet this emergency vast hospitals and convalescent depots capable of accommodating over 22,000 men were erected west of the Seine at Trouville. Additional general hospitals with accommodation for over 7,000 patients were established in the neighborhood of Boulogne, Etaples, and elsewhere. Between January, 1916, and November, 1918, the total capacity of hospitals and convalescent depots in France grew from under 44,000 to over 157,000 persons.

Great installations were set up for the manufacture of gun parts and articles of like nature, for the repair of damaged material as well as for the utilization of the vast quantities of articles of all kinds collected from the battlefields by the organization working under the direction of the controller of salvage. The forestry directorate, controlling over 70 Canadian and other forestry companies, worked forests all over France, in the northwest, central and southwest departments, the Vosges, Jura, and Bordeaux country. As the result of its work our armies were made practically independent of oversea imported timber. The directorate of agricultural production organized farm and garden enterprises for the local supply of vegetables, harvested the crops abandoned by the enemy in his retreat, and commended the reclamation of the devastated area.

At the same time a great saving of shipping was effected by the speeding up of the work at the docks. The average tonnage discharged per hour in port rose from 12½ tons in January, 1917, to 34½ tons in July, 1918, while the average number of days lost by ships waiting berth at the ports fell from some 90 ship days per week at the beginning of 1917 to about 9 ship days per week in 1918.

For the accommodation of so wide a range of services, installations of all kinds, hutments, factories, workshops, storage for ammunition, clothing, meat, and petrol, power houses and pumping stations, camps, and hospitals had to be planned and constructed by the directorate of works. Our business relations with the French—the obtaining of sites and buildings—called for the establishment of a directorate of hirings and requisitions, while my financial adviser in France assisted in the adjustment of financial questions connected with the use of French railways and harbors, the exploitation of French forests, and similar matters. The safeguarding from fire of the great number of buildings erected or taken over by us and of the masses of accumulated stores was intrusted to a definite staff under the supervision of a fire expert.

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The creation and maintenance of the great organization briefly outlined above made big demands upon our available supply of personnel. Though these demands, so far as possible, were met, under the supervision of the controller of labor, by imported labor or prisoners of war, it was not practicable at any time to supply more than a proportion of our needs in this manner. Many fit men who might otherwise have reinforced the fighting line had also to be employed, especially during the earlier stages of the war.

As, however, our organization arrived at a greater state of completion and its working became smooth, so it began to be possible to withdraw considerable numbers of fit men from the rearward services. In many cases it was possible, where replacement was necessary, to fill the places of the fit men so withdrawn by women or unfit men. In this way, when the man-power situation became acute, a considerable saving was effected. During the great British attacks of 1918, of a total male feeding strength of a little over two and one-quarter millions, one and one-half millions were in front of railhead. Even so, as has been found to be the case in the armies of all other belligerents, so in our Army the number of fit men employed in the rearward services has at all times been large, and necessarily so.

It is hardly too much to assert that however seemingly extravagant in men and money, no system of supply except the most perfect should ever be contemplated. To give a single example, unless our supply services had been fully efficient the great advance carried out by our armies during the autumn of last year could not have been achieved.

Wars may be won or lost by the standard of health and morale of the opposing forces. Morale depends to a very large extent upon the feeding and general well-being of the troops. Badly supplied troops will invariably be low in morale, and an army ravaged by disease ceases to be a fighting force. The feeding and health of the fighting forces are dependent upon the rearward services, and so it may be argued that with the rearward services rests victory or defeat. In our case we can justly say that our supply system has been developed into one of the most perfect in the world.

The preceding paragraph illustrates the demands which the conduct of operations made on the staff and directorates controlled by the Quartermaster General. The parallel development of The Adjutant General's branch, while concerned with matters less patent to the casual observer, has been no less remarkable. The problem of insuring the supply of reenforcements at the time and places at which they will be required to replace casualties is present in all warfare, and is difficult in any circumstances. In operations conducted on the scale reached in this war it is exceedingly intricate. The successful solution of this problem alone entitles The Adjutant

General and his staff to the greatest credit. It has formed, however, but a small part of their work.

Owing to the impossibility of foretelling what claims would be made on man power by industry or by other theaters of war, it was necessary to prepare elaborate forecasts of the personnel likely to be required at various dates, and to work out in advance the best manner of utilizing reenforcements in the event of their being available in greater or less numbers. We were faced with an unexpected contraction in man power in the winter of 1917 and an unexpected expansion in the summer of 1918. Both these developments were encountered with a success which could only have been attained by the greatest forethought and application on the part of the staff concerned.

To reduce to cadre a depleted division, to fill it up when men became available, to break up a battalion and redistribute its personnel, to comb out a certain number of fit men from the rearward services, all sound simple operations. In reality each requires an immense amount of sympathetic treatment and clerical labor, the extent of the work involved being instanced by the fact that in the month of April, 1918, over 200,000 reinforcements were sent up to the fighting forces. The carrying out of measures of this nature was made more difficult by the continual formation of new types of unit to meet new requirements. It was necessary to find the personnel for those units with the least possible dislocation elsewhere, and with an eye to the most advantageous employment of the individual in regard to his medical category and special qualifications. The following figures will give some indication of the magnitude of the task. The Adjutant General's office at the base has prepared over 8,000,000 records containing the military history of individual soldiers in France, and has received and dispatched over 22,000,000 letters.

Whatever the quality of the troops, a just and efficient administration of military law is an indispensable adjunct to a high standard of discipline. I gratefully acknowledge the care with which officers of the adjutant general's branch in all formations have insured the observation of every safeguard which our law provides against injustice. They have seen to it that every plea which an accused or convicted soldier wishes to bring forward is heard, and that commanders are advised as to the suitability of sentences. I take this opportunity of recording my satisfaction at the success which has attended the operation of the suspension of sentences act. The number of men under suspended sentence who by good conduct and gallant service in the field have earned remission of their sentence has been most encouraging.

Closely related to the administration of military law is the work of the military police under the provost marshal and of the military prisons in the field. In the battle zone, where frequently they had to do duty in exposed positions under heavy fire and suffered severe casualties, the military police solved an important part of the problem of traffic control by preventing the unavoidable congestion of troops and transport on roads in the vicinity of active operations from degenerating into confusion. In back areas their vigilance and zeal have largely contributed to the good relations maintained between our troops and the civilian population.

Although the number of soldiers undergoing sentences of imprisonment in France has at no time amounted to one per thousand, the size of the Army has necessitated a considerable expansion of the military prisons in the field. The director of military prisons, his governors and warders, have sought not retribution but to build up the self-discipline of the prisoner. They have been rewarded by seeing a large percentage of the men committed to their charge subsequently recover their characters as good soldiers.

Under the general control of the adjutant general, the base stationery depot, which went to France in 1914 with a personnel of 10, has expanded into the directorate of Army printing and stationery services, employing over 60 officers and 850 other ranks. In addition to the printing and distribution of orders and instructions it undertook the reproduction on a vast scale of aerial and other photographs, the number of which grew from 25,000 in 1916 to two and a quarter million in 1918. Other examples of administrative success are the prisoners of war section and the directorate of graves registration and inquiries.

Of the care taken for the physical and moral welfare of the troops I can not speak too highly.

In the former domain the achievements of the director general of medical services and his subordinates have been so fully recorded by me in previous dispatches that they need no further emphasis. It is sufficient to say that, in spite of the numbers dealt with, there has been no war in which the resources of science have been utilized so generously and successfully for the prevention of disease or for the quick evacuation and careful tending of the sick and wounded.

In the latter sphere the devoted efforts of the Army chaplains of all denominations have contributed incalculably to the building up of the indomitable spirit of the Army. As the result of their teaching, all ranks came to know and more fully understand the great and noble objects for which they were fighting.

Under the immediate direction of the adjutant general in matters concerning military administration, the principal chaplain for members of all churches, except the Church of England, and the deputy

chaplain general for members of the Church of England administer to the greatest harmony a very complete joint organization. Provided with a definite establishment for armies, corps, and divisions, as well as for the principal base ports, base camps, hosptials, and certain other units, they insure that the benefit of religion is brought within the reach of every soldier.

In all the senior offices of this joint organization down to divisions the principal chaplains and deputy chaplain general have each their representatives, the appointments to those offices in the principal chaplain's section being apportioned between the different churches, Protestant and Roman Catholic, in proportion to the numbers of their following in the Army as a whole. The organization has worked for the common good in a manner wholly admirable and with a most noteworthy absence of friction. It has undoubtedly been much assisted, both in its internal economy and in its relations with commanders and troops, by being at all times in direct touch with the adjutant general's branch.

No survey of the features of the war would be complete without some reference to the part played by women serving with the British armies in France. Grouped also under the adjutant general's branch of the general staff, Queen Alexandra's Imperial Military Nursing Service, the Nursing Sisters of the Canadian Army Medical Corps, and of the Australian, New Zealand, South Africa, and Territorial Force Nursing Services, and the British Red Cross Society have maintained and embellished a fine tradition of loyalty and efficiency. These services have been reinforced by members of voluntary aid detachments from the British Isles, the oversea Dominions, and the United States of America, who have vied with their professional sisters in cheerfully enduring fatigue in times of stress and gallantly facing danger and death.

Women in the British Red Cross Society and other organizations have driven ambulances throughout the war, undeterred by discomfort and hardship. Women have ministered to the comfort of the troops in huts and canteens. Finally, Queen Mary's Auxiliary Army Corps, recruited on a wider basis, responded with enthusiasm to the call for drafts, and by the aid they gave to our declining man power contributed materially to the success of our arms.

The experience gained in this war alone, without the study and practice of lessons learned from other campaigns, could not have sufficed to meet the everchanging tactics which have characterized the fighting. There was required also the sound basis of military knowledge supplied by our training manuals and staff colleges.

The principles of command, staff work, and organization elaborated before the war have stood the test imposed upon them and are sound. The military-educated officer has counted for much, and

the good work done by our staff colleges during the past 30 years has had an important influence upon the successful issue of the war. In solving the various strategic and tactical problems with which we have been faced, in determining principles of training and handling of troops and in the control and elaboration of army organization generally, the knowledge acquired by previous study and application has been invaluable. Added to this have been the efficiency and smoothness of working resulting from standardization of principles, assisted in many cases by the previous personal acquaintance at the staff college of those called upon to work together in the field.

The course of the war has brought out very clearly the value of an efficient and well-trained high command, in which I include not merely commanders of higher formations, but their staffs also.

This has been the first time in our history that commanders have had to be provided for such large forces. Before the war, no one of our generals had commanded even an army corps such as has been used as a subsidiary formation in the battles of the last few years. In consequence, commanders have been faced with problems very different to those presented by the small units with which they had been accustomed to train in peace. That they exercised their commands with such success as most of them did shows, I venture to think, that their prior training was based on sound principles and conducted on practical lines.

Similarly, as regards the staff, the magnitude of our operations introduced a situation for which no precedent existed. The staff colleges had only produced a reserve of staff officers adequate to the needs of our Army on a peace footing and for the mobilization of the expeditionary force of six divisions. Consequently, on the expansion of the Army during the war many officers had to be recruited for staff appointments—from good regular officers chiefly, but also from officers of our new armies—and trained for the new duties required of them. Though numbers of excellent staff officers were provided in this way, it was found, as a general rule, that the relative efficiency in staff duties of men who had passed through the staff colleges as compared with men who had not had that advantage was unquestionably greater.

Good staff work is an essential to success in all wars, and particularly in a struggle of such magnitude as that through which we have just passed. No small part of the difficulty of achieving it lies in the possibility that officers on the staff of higher formations may get out of touch with the fighting forces and so lose sense of proportion and become unpractical. Every endeavor was made to avoid this by maintaining a constant interchange of such officers with others from the front, so that all might keep abreast with the latest ideas and experience both in the fighting line and elsewhere. In pursuance of

this principle, in addition to 18 officers from Army or corps staff and other officers from the intelligence corps or general list, there were brought in during the period of my command some 50 officers direct from active duty with divisions or smaller units to hold for longer or shorter periods appointments in the general staff branch at general headquarters.

It may be accepted as a general rule that previous organizations should be upset as little as possible in war. As each war has certain special conditions, so some modification of existing ideas and practices will be necessary, but if our principles are sound these will be few and unimportant. In the present war new organizations and establishments for dealing with the demands of both the fighting and rearward services have been brought into being continually and added to or absorbed by our existing organization and establishment.

The constant birth of new ideas has demanded the exercise of the greatest care, not only to insure that no device or suggestion of real value should be overlooked or discouraged, but also to regulate the enthusiasm of the specialist and prevent each new development assuming dimensions out of proportion to its real value. As the result of our own experience and that of the French during the fighting of 1915, all kinds of trench weapons were invented—bombs, bomb throwers, mortars, and even such instruments as trench daggers. In those days the opinion was freely expressed that the war would be finished in the trenches and every effort was made to win victories in the trenches themselves. In consequence, rifle shooting was forgotten and was fast becoming a lost art. Similarly, as regards artillery, the idea of dominating and defeating the hostile artillery before proceeding to the infantry attack was considered an impossibility.

Then followed the experience of the Battle of the Somme in 1916, which showed that the principles of our prewar training were as sound as ever. That autumn a revival of old methods was inaugurated. Musketry shooting was everywhere carried out, and bayonet fighting was taught as the really certain way of gaining supremacy in hand-to-hand fighting. At the same time, as pointed out before, the greatest care was devoted to artillery shooting, as well as to the training of all arms for open fighting. The events of the next two years fully confirmed the lessons drawn from the Battle of the Somme. In short, the longer the war has lasted the more emphatically has it been realized that our original organization and training were based on correct principles. The danger of altering them too much, to deal with some temporary phase, has been greater than the risk of adjusting them too little.

Some idea of the extent of the organization built up during the war for the training of our armies can be gathered from a survey of the different schools actually established.

In the armies important schools were maintained for the instruction of officers and noncommissioned officers of infantry and artillery in their several duties, for training in scouting, observation, and sniping, in the use of trench mortars, in signaling, musketry, and bayonet fighting, antigas precautions, mining, and defense against tanks. The different corps controlled a similar series of schools. Added to these were the special schools of the cavalry corps, including a school of equitation; the tank corps mechanical school; and the different courses instituted and managed by divisions, which were largely attended whenever the battle situation permitted.

Other schools under the direct supervision of general headquarters provided instruction in the machine gun, Lewis gun and light mortar, in antiaircraft gunnery, in observation for artillery, in sound ranging and flash spotting, wireless, bridging and other engineering duties, in firing and bombing from aeroplanes, and in physical and recreational training. At the base depots big training and reenforcement camps were set up for infantry, artillery, cavalry, engineers, machine gunners, cyclists, tank corps, signal and gas personnel. Further, a regular succession of staff officers and others were sent home to take part in the various schools and courses established in England.

In the course of the past year it was found desirable to make provision for the more thorough coordination of effort among these various schools and also for assisting commanders, especially during battle periods, in the training and instruction of such troops as might from time to time be in reserve. For this purpose an inspectorate of training was established. Training and organization must always go hand in hand; for while tactical considerations dictate the organization of units and methods of training, upon sound tactical organization and training depend the development and effective employment of good tactics.

In the early spring of 1918 the foundations were laid of an educational scheme which might give officers and men throughout the army an opportunity to prepare themselves for their return to civil life. Delayed in its application by the German offensive and the crowded events of the summer and autumn of that year, since the conclusion of the armistice the scheme has been developed with most excellent results under the general direction of the training subsection of my general staff branch and generously supported in every possible way by the educational department at home. Divided into a general and a technical side, every effort has been made both to give opportunities for the improvement of general knowledge and to enable trained men to "get their hands in" before returning to civil life. In this way between 400,000 and 500,000 persons have been brought

under instruction, while the number of attendances at lectures has approached a million in the course of a month.

The feature of the war which to the historian may well appear the most noteworthy is the creation of our new armies.

To have built up successfully in the very midst of war a great new army on a more than continental scale, capable of beating the best troops of the strongest military nation of prewar days, is an achievement of which the whole Empire may be proud. The total of over 327,000 German prisoners captured by us on the western front is in striking contrast to the force of six divisions, comprising some 80,000 fighting men all told, with which he entered the war. That we should have been able to accomplish this stupendous task is due partly to the loyalty and devotion of our Allies and to the splendid work of the Royal Navy, but mainly to the wonderful spirit of the British race in all parts of the world.

Discipline has never had such a vindication in any war as in the present one, and it is their discipline which most distinguishes our new armies from all similarly created armies of the past. At the outset the lack of deep-seated and instinctive discipline placed our new troops at a disadvantage compared with the methodically trained enemy. This disadvantage, however, was overcome, and during the last two years the discipline of all ranks of our new armies, from whatever part of the Empire they have come, was excellent. Born from a widespread and intelligent appreciation of the magnitude of the issues at stake and a firm belief in the justice of our cause, it drew strength and permanence from a common-sense recognition of what discipline really means—from a general realization that true discipline demands as much from officers as from men, and that without mutual trust, understanding, and confidence on the part of all ranks the highest form of discipline is impossible.

Drawn from every sphere of life, from every profession, department, and industry of the British Empire, and thrust suddenly into a totally new situation full of unknown difficulties, all ranks have devoted their lives and energies to the service of their country in the whole-hearted manner which the magnitude of the issues warranted. The policy of putting complete trust in subordinate commanders and of allowing them a free hand in the choice of means to attain their object has proved most successful. Young officers, whatever their previous education may have been, have learned their duties with enthusiasm and speed, and have accepted their responsibilities unflinchingly.

Our universities and public schools throughout the Empire have proved once more, as they have proved time and again in the past, that in the formation of character, which is the root of discipline,

they have no rivals. Not that universities and public schools enjoy a monopoly of the qualities which make good officers. The life of the British Empire generally has proved sound under the severest tests, and, while giving men whom it is an honor for any officer to command, has furnished officers of the highest standard from all ranks of society and all quarters of the world.

Promotion has been entirely by merit, and the highest appointments were open to the humblest, provided he had the necessary qualifications of character, skill, and knowledge. Many instances could be quoted of men who from civil or comparatively humble occupations have risen to important commands. A schoolmaster, a lawyer, a taxicab driver, and an ex-sergeant major have commanded brigades; one editor has commanded a division and another held successfully the position of senior staff officer to a regular division; the undercook of a Cambridge college, a clerk to the metropolitan water board, an insurance clerk, an architect's assistant, and a police inspector became efficient General Staff officers; a mess sergeant, a railway signalman, a coal miner, a market gardner, an assistant secretary to a haberdasher's company, a quartermaster sergeant, and many private soldiers have risen to command battalions; clerks have commanded batteries; a schoolmaster, a collier, the son of a blacksmith, an iron molder, an instructor in tailoring, an assistant gas engineer, a grocer's assistant, as well as policemen, and privates, have commanded companies or acted as adjutants.

As a body, and with few exceptions, new officers have understood that the care of their men must be their first consideration; that their men's comfort and well-being should at all times come before their own; that without this they can not expect to win the affection, confidence, loyalty, and obedience of those they are privileged to command, or to draw the best from them. Moreover, they have known how to profit by the experience of others and in common with their men they have turned willingly to the members of the old Regular Army for instruction and guidance in all branches of their new way of life.

On their part, officers, noncommissioned officers, and men of the old Regular Army have risen to the demands made upon them in a manner equally marvelous. Their leaven has pervaded the whole of the mighty force which in four and one-half years of war has gathered from all parts of the world around the small, highly trained army with which we entered the war. The general absence of jealousy and the readiness to learn, which in the field has markedly characterized all ranks of our new armies, is proof both of the quality of our old army and of the soundness of our prewar training. If further proof were needed, it is found in the wonderful conduct

and achievements of our armies, new and old, and in the general pride with which they are universally regarded.

In the earlier stages of the war the Regular Army was called on to provide instructors and cadres around which the new armies could be formed. All that was best in the old Regular Army, its discipline based on force of character, leadership, and mutual respect, its traditions, and the spirit that never knows defeat, have been the foundations on which the new armies have been built up. Heavy demands were necessarily made upon our establishment of trained regular officers, most regretably depleted by the heavy sacrifices of early days of the war. The way in which such demands have been met by those who survived those days has justified our belief in them.

Neither have the officers of the new armies, whether drawn from the British Isles or the Dominions, risen with less spirit and success to the needs of the occasion. The great expansion of the Army, and the length of the war, necessitated an ever-increasing demand being made on them for filling responsible positions in command, staff, and administrative appointments. The call has been met most efficiently. The longer the war continued, the greater became the part played in it by the new armies of the Empire.

AVIATION.

METHOD OF HANDLING PLANES IN AIR DETACHMENT.

Source: Reliable.

31 October 1919.

Flying Crews.

Every airboat and its crew is considered as a unit. The entire responsibility for repair, inspection, operation, and upkeep resting entirely with the assigned crew. The crews are permanent and once made are changed only when absolutely necessary. To each airboat is assigned the following permanent crew:

1 first pilot.
1 second pilot.
1 chief machinist's mate (aviation), first mechanician.
1 machinist's mate, first class (aviation), second mechanician.
1 chief electrician (radio) or electrician, first class (radio) radio operator.
1 seaman for general utility.

Each pilot is directly responsible for the repair, upkeep, inspection, and all operations of his boat. Crews are not shifted from plane to plane, a crew having been assigned to a given boat or plane remains with the plane throughout its entire connection with the air detachment. No explicit internal details are laid down for any crews, the only stipulation being that the machine shall be ready for whatever work it may be called upon to perform. It is left strictly "up to the pilot," who is given all possible latitude in methods of internal discipline and details of work in his plane. All cleaning, doping, minor repairs to wing fabric, replacement wires, refueling, engine repairs, etc., are done entirely by the crew of the plane. This requires that each member of the crew be a competent, all-around "aircraftsman," in addition to being qualified in the particular specialty which his rating signifies. When a plane is required to refuel or to shift berth, the entire crew of the plane is required to be on board, the first pilot taking charge of the maneuver. All orders pertaining to any plane are given direct to the first pilot, who takes complete charge, and issues necessary supplementary orders.

By conducting operations along this line it has been found that a surprisingly small "repair crew" is required.

Occasionally major repairs are necessary, such for instance as replacing engines or making repairs to hulls, or possibly extensive repairs to control surfaces, or similar work, which is beyond the capacity of the plane crew to perform. In such cases, the repair detail is called upon. But even in such cases, the entire crew of the machine is actively employed, and only so much assistance as is absolutely necessary is detailed from the repair crew, and in all cases the pilot of the plane supervises and inspects all work, and is held responsible for its integrity. The seaman of the crew does not fly with the plane regularly, although he is given an opportunity to take occasional flights in order to keep up his interest in the machine to which he is assigned. He is used as a general all-round helper to the other members of the crew, cleaning bilges, fetching tools or material, etc., and thus serves his "aircraftsman apprenticeship." Although not absolutely necessary, it has been found most desirable on long flights to carry both mechanicians.

It has been found that this general procedure fosters to a marked degree a feeling of professional pride in all members of the crew. Each crew feels that good work will immediately become apparent in increased operating efficiency of the plane to which assigned. Further than this it permits of no alibis. All machines operate under identical conditions, all crews have an even start, since each crew follows its machine through assembly at the factory and the percentage of commission maintained by the various machines is direct measure of the efficiency of the crew assigned to that machine. There is no opportunity for any crew to blame the poor work of anyone else for faults which occur, since no one else ever touches the machine.

Mooring Planes and Handling on Water.

All planes are kept anchored out in the water at all times. When based on a certain port for a period of several days or longer, permanent moorings are laid down, with heavy anchors and large kapok buoys.

These moorings are constructed as follows: To a thousand-pound mushroom anchor is bent about 12 fathoms of half-inch wire cable. This cable is shackled at the upper end to a large kapok pear-shaped buoy. Three wire bolt ropes are led around this buoy and spliced together at the top and led around a thimble into which the towing pendant of the airboat is shackled. A small cork pilot buoy is bent to the main mooring cable below the kapok buoy by a two-fathom length of 2-inch manila. In picking up the mooring the airboat taxis up, and a man in front cockpit picks up pilot buoy, and takes a turn around the Davis gun mount with the manila line, thus holding the boat in position until the towing pendant is shackled into

place on the kapok buoy. Boats are seldom if ever used to bring machines up to a mooring buoy, as it has been found much more expeditious and at least as safe to bring the plane up to her moorings under her own power. In getting away from the mooring, a turn is taken about the Davis gun mount with the pilot buoy line, and the towing pendant unshackled. The pilot buoy is held until both engines are started and then the plane is cast off. It has been found that moorings can be picked up and cast off quickly and safely in this way, even with planes moored close together, and in all conditions of wind. Where only a temporary stay is expected, planes are anchored. Standard equipment for each plane is one 75-pound anchor, with two 15-fathom lengths of 2½-inch manila. Two 15-fathom lengths of light manila are also furnished for wing lines. These wing lines have been found necessary on numerous occasions, particularly when coming alongside to fuel or when going alongside a dock for exhibition purposes as is sometimes required, and these lines in the boats have on many occasions prevented damage to the planes, which otherwise could not have been avoided.

It has been found that 75-pound anchors will hold under any normal conditions, provided a long enough scope is allowed. It is advisable phen anchoring to put over the whole 30 fathoms of anchor line. A 60-pound anchor was held in some cases with a 30-fathom scope, when a 120-pound anchor has dragged with a 15-fathom scope. It is considered that a 75-pound anchor with 30 fathoms scope will hold an *F–5–L* in any but storm winds.

F–5–L's are very maneuverable on the water and may when handled by an experienced pilot be brought to in almost any position provided both motors are available. It is, of course, difficult to handle them down wind.

Fueling.

All planes are fueled from the stern of the *Shawmut*. Two 5,000 gallon gasoline tanks are carried on the stern of the *Shawmut*, with pipes leading outboard. Planes are taxied under the stern under their own power, the crew of each plane handling its own machine; this is rendered very easy because the *Shawmut* with her relatively light draft and high freeboard nearly always lies head to wind. A large funnel with detachable chamois strainer is permanently fixed on the stern and a 2-inch rubber hose led from this down to the cockpit of the plane. In this way, under normal circumstances, a plane can be brought alongside, fueled and tied up to her buoy in a half hour with little difficulty. In coming alongside one man is sent to each overhang to secure wing lines and fend off in case wing swings in, and one man in the bow to secure bow lines. In fueling all lines are heaved from the ship to the plane. If, as rarely occurs,

Shawmut is lying stern to wind, an anchor is dropped and line led over the stern and plane is eased down in this manner. When finished fueling, plane hauls off, shifts anchor line to bow, and when it has swung head to wind, starts one engine, breaks anchor, taxies clear. This operation, of course, requires more time, but has been successfully carried out on several occasions.

Repairs.

Practically all repairs are completed by the regular crew of the plane. There are, however, certain repairs which are beyond the capacity of the plane crews to effect. To this purpose there is a limited repair crew of various ratings, from which are detailed certain men to assist in the various repairs. This repair crew is under the direction of a chief machinist (aviation) who takes active charge of all repair activities which take place on board the *Shawmut*.

This includes repairs to control surfaces which can not be effected on board the plane, preparing engines for installation, etc. The repair officer also has charge of all spare materials, lubricating oil, tool and store room, engine logs, etc.

As a general rule few major parts are carried for *F–5–L's*. Wires turnbuckles, control surfaces, wing-tip floats, etc., are carried, however. It has been found that under any but most unusual circumstances there is no need to renew wing panels. Only one such case has arisen since February, and this occurred in Newport, when *Shawmut* dragged anchor in an excessively heavy blow and drifted down on one plane before steam could be raised. It is conceivable that there might arise a need for a whole spare set of wings, but it is believed that loss of the great amount of space required for stowage is not warranted by the possible advantage to be gained. No attempt is made to carry a complete overhaul of engines, since it is possible to carry sufficient spare engines on board to meet the demands of the detachment for a period of six months in less space than would be required by the additional shop space and berthing space for the additional personnel which this would require. For this reason, when engines require overhaul, they are replaced by spares on hand and are sent to shore stations for overhaul.

For making hull repairs the seaplane lighters are used. Lighters are now available at Norfolk, Newport, and Guantanamo. These lighters are standard type, built during the war for the purpose of towing seaplanes to a distant bombing objective. They are fitted with a cradle running on an inclined track. The plane is brought astern of the lighter and after compartment of the lighter is flooded and the stern sunk below the water line, plane is hauled into the cradle, cradle hauled up the track by a winch, and the after compartment blown out by a small one-cylinder air compressor, similar to the portable air

compressors used by contractors for air drills and hammers. If a bottom is to be repaired screw jacks are fitted, one under each engine strut, and the plane is lifted clear of the cradle. Plane is then stayed with fore and aft and thwartship guys, cradle dropped astern of the plane, thus leaving about a 3-foot working space under the hull. In Guantanamo in this way a complete new bottom was built into an *H–16*, which ran on a submerged piece of driftwood in taking off and stove the bottom in.

It has been found necessary to haul all planes out occasionally to clean the bottoms, as they become fouled with barnacles and sea grass. No definite interval s prescribed between docking periods; this interval depends on the port in which planes happen to be flying, the necessity for cleaning being determined by examination of the bottom of the hull while flying. For this purpose the lighter is of great value. It takes no longer to pull a machine out of the water in this way than it does to pull one out on a slipway at an air station, and fewer men are required. Where repairs are required to wing-tip floats or wing tips the plane is run to the beach and the wing tip pulled in over the beach. No damage to bottoms may be feared if the beach is not rocky. In connection with motion pictures which were taken this summer by order of the Navy Department several machines were required in the scenario to run up on the beach repeatedly. Examination of the bottoms showed that no damage had been done. The machine which the *Shawmut* dragged into pulled out her towing plate, broke a wing, and drifted ashore. This machine lay high and dry on the beach for a week while waiting for the arrival of a new wing, and her bottom was unhurt. While on the beach an entire new right wing was assembled and installed. No means were available for leveling up, but machine was lined up by eye, and the next day flew without incident from Newport to Philadelphia Navy Yard.

When motors require changing machine is hauled out on lighter, horses erected on the lighter with skids level with engine beds, engines are hauled out into the skids by hand, and are then hoisted on board *Shawmut* with ship's tackle, a new engine lowered on the skids and slid into place. Lighter has been brought alongside, old engines lifted out, new engines lifted in, and lighter shoved off from ship in less than an hour and a half by this method.

There seems to be an impression throughout the service that the *Shawmut* is an especially equipped seaplane tender, carrying complete seaplane repair shops, special apparatus, etc. There are no special shops or other facilities other than those which were already on board the *Shawmut.* The mines and mine trolleys were removed and the entire mine deck turned over to aviation personnel. This

deck is used as berthing, stowage, and working space. Work benches, battery-charging equipment, storerooms, and bunks have been installed by the aviation personnel. Other equipment would, of course, be desirable to meet certain repair demands; in fact, possible major repairs were looked forward to with dread at first, but when repairs have become necessary it has been found that by the use of improvised equipment and plenty of man power no great difficulty has been experienced in making any kind of repairs which the service requires.

Cruising.

For ordinary cruising it is customary for the six machines to cruise in two flights of three machines each, maintaining a V formation in each flight, the two flights keeping within sight of each other where practicable, or in other cases proceeding independently. This V formation is a very handy cruising formation, the leader keeping station ahead of and about a hundred feet above the other two planes. It has been found easy to maintain a very close formation in this manner, machines keeping within a hundred yards of each other at times. Complete turns can be made without breaking formation, provided the leader maintains a speed about 10 knots greater than minimum flying speed.

As the result of numerous trials of various methods, the following remarks relative to close formation work with large airboats are made:

Turns are very difficult unless a very close formation is maintained.

It is essential that the two following machines maintain station about 50 to 100 feet below the leading plane; this obviates interference through slip-stream effect.

In making turns it is impracticable for the two following machines to interchange positions This method has been tried and found to be extremely difficult as well as extremely dangerous.

No special warning signals are necessary before starting turns provided the leader goes into his turn steadily and slowly. Once a turn is started it may be completed as sharply as desired within reason without danger.

In making turns the inside machine first edges in toward the leader, throttling to low speed and maintaining altitude. This is important if the inside machine starts turning without first edging in and will almost invariably find himself coming out of the turn ahead of the leader. The outside machine opens throttles to full speed, keeping close to the leader, maintaining altitude. It will usually be found that once the turn is started the outside machine can maintain formation at considerably less than full speed.

Complete 360° turns have been made in this way, relatively sharp,

all machines maintaining formation throughout and after the turn without any great difficulty. Ragged turns seldom, if ever, occur in close formation, nearly always in loose formation. The same principles apply to five-machine V formations, although wider turns are necessary to maintenance of good formations.

Before landing it is the general rule to break formation and each machine lands independently, following the movements of the leader.

If there is plenty of room it is always well to take off in formation. It is easy to maintain formation once formed, but rather difficult to establish formation.

Three-machine V formation with three machines is by far the most comfortable for long-distance cruising.

For ordinary search work, the "sweep" is used. This is merely a scouting line, with each machine just maintaining sight touch with the next machine, taking guide as designated and changing directions as follows:

On signal from the flag plane the outside machine turns across the tail of the next machine. When first machine is directly astern of second machine, second machine turns, and so on. All machines thus maintain position and sight touch. In actual search operations with the Atlantic Fleet this method has given most satisfactory results. The ordinary principles or strategic scouting are applied on all cases, though methods are modified somewhat, of course, to meet the peculiar conditions.

The usual formation for bombing exercises is a column, distance about 1 mile. This is merely a "follow the leader" formation.

Shifting Base.

Under ordinary circumstances, traval flights are usually limited to the distance that the *Shawmut* can steam between daylight and dark. This is done as a matter of convenience in order that the plane crews may have a place to sleep at the destination. When public quarters are available at destination, however, longer flights are made, and the crews anchor planes and go ashore to await the arrival of the *Shawmut.*

The procedure is about as follows:

The day before leaving base all planes cast off permanent moorings and anchor. Moorings are lifted and taken on board the *Shawmut.* Plane crews get early breakfast the following morning and proceed to destination. As soon as last plane is off and away, *Shawmut* gets under way and proceeds to destination. Arriving at destination, plane crews anchor planes, inspect all controls and surfaces, do any necessary work which can be completed with the facilities on board. Crews of planes usually carry a suit of liberty blues along, as well as soap and towel. When the work is completed

all hands wishing to do so go ashore, leaving one member of the crew on each plane, and wait until *Shawmut* arrives. If detachment is to be at the new base for any length of time, the boatswain lays moorings the following day, planes up anchor, tie up to moorings, and the new base is established. Bases have been established in this manner in Guantanamo Bay, Cuba; Port Au Prince, Haiti; Key West, Florida; Hampton Roads, Va.; Solomon Island, Cold Spring Inlet; Philadelphia Island, Newport, and Kingston, Jamaica.

DIRIGIBLE HANGAR.

Source: Reliable.

6 November 1919.

The dirigible hangar to be erected at Lakehurst, N. J., contract for which has recently been let, is, as far as is known, the largest single area inclosed under a roof of one span. The building is 950 feet long over all, 352 feet wide, with a clear span of 265 feet. The over-all width of the building is approximately 200 feet. The clear height at entrance is 174 feet. It is almost impossible to visualize these dimensions. The grand concourse of the Union Station, Washington, is 760 feet long by 125 feet wide by 50 feet high. Six of these concourses can be placed together and put within the building without anywhere filling it. The entire Capitol can be placed within it with the exception of 30 feet of the dome. The Woolworth Building, New York, laid on its side, would not touch any portion of the structure. The roof is supported by steel three-hinged arch trusses and the entrance doors at both ends are so planned that one of them is to be used as a traveling crane for the erection of the building. The building is so designed as to withstand a wind pressure of 100 miles per hour either inside or out. This, of course, also applies to all parts of the structure. The doors are run upon tracks and are operated electrically.

The scale model of the dirigible hangar at Lakehurst, N. J., now being constructed by the Bureau of Yards and Docks, will be an exact reproduction of the proposed building to a scale of $\frac{1}{16}$ inch per foot. The trusses and steel work of the interior are being shown in detail, each truss being built up separately of cardboard and bamboo, with all the angles, braces, and ties accurately shown. Although the work demands infinite care and patience in building, it is believed the time and labor will be well repaid by the clearness with which the system of construction is instantly grasped by the observer, when otherwise study would have to be made of blue prints so technical that only the trained engineer could vizualize. Request has been made for the exhibition of the model in the National Museum, when its purposes in the bureau have been fulfilled.

AIRCRAFT RADIO COMMUNICATIONS.

Source: Reliable.

25 October, 1919.

During the trip from Washington to Norfolk constant communication was maintained between the *NC–4* and the Anacostia Air Station, and a large number of messages were exchanged. All signals were received at the air station on the new balanced underground antenna, which permitted them to be copied in spite of interference from Arlington and the navy yard. Lieut. Rodd received the voice message (telephone) from Anacostia clear to the mouth of the Potomac and after the buzzer modulation (spark) was used which gave satisfactory communication for the remainder of the trip. The *NC–4* used a spark transmitter and her signals were very good at all times. She was not provided with a telephone set of sufficient power to transmit more than a few miles but was able to receive the Anacostia telephone up to 100 miles in a very satisfactory manner. The ignition disturbances on the *NC–4* appear to have been very satisfactorily overcome, using the same methods as have been applied at Anacostia to *H–16*, No. 4073, namely, using separate ignition batteries, placing them very close to the engines. The Anacostia Air Station has already recommended this as a standard method of installation. It is much better, and the radio compass will be able to do very much better work in the future.

When the *NC–4* was on her way to Washington from Baltimore the first accurate report of her position was sent in by radio by Lieut. Ott of this station, who was on his way to Crisfield, Md., in flying boat *HS–2*, No. 1970, using a spark transmitter operated and controlled entirely from the pilot's seat. He passed the *NC–4* near the mouth of the Potomac and immediately reported the same by radio to the air station. On the trip to Norfolk the *NC–4* reported when the escorting planes turned back. Intelligent use of the radio adds a great deal to the safety as well as to the interest of such flights.

MOTHER SHIP FOR LIGHTER-THAN-AIR CRAFT.

Source: Reliable.

6 November 1919.

Arrangements are being made to equip a lighter-than-air mother ship for use with the fleet. The ship will be equipped with two hydrogen generators and three compressors for the inflation of fleet kite balloons.

INTERNATIONAL.

ARTICLES IN JAPANESE NEWSPAPERS ON SHANTUNG QUESTION.

Source: Reliable.

18 September 1919.

The following are extracts of certain articles published by Japanese newspapers with reference to China's opposition to Japan's policy in Shantung.

An outstanding feature of the Japanese attitude is the inability to understand why the award of the peace conference should have aroused such opposition among the Chinese. The comments in this connection are illuminating evidence of the genuine conviction that prevails in Japan as to the justice of its position and the uprightness of its aims. The Japanese believe that they are striving to promote cordiality between the two nations and to secure the safety and well being of China, and they are accordingly pained at China's "ingratitude." Very few can see any other side to this question. They justify their desire for territorial footholds on the plea that from such points of vantage they can the better guard China from occidental aggression, and they base their eagerness to secure mining and other concessions on the necessity of providing for the sinews of war to "preserve the peace of the Far East." They seem to be actually at a loss to account for the "folly" of the Chinese, who repel their friendly advances and court "dangerous" friends like England and America. The following observations from the Herald of Asia are typical of the viewpoint of the average Japanese:

It is unfortunate that all Japan's efforts in trying to discourage western aggression in China should be interpreted by that country as aiming at aggression on the part of Japan herself. Japan, of course, does not pretend to be wholly unselfish in her policy toward China; but it is a self-interest that is as good for China as for Japan. Japan is protecting China chiefly for the sake of her own security, for the more China gives way to western nations, the more Japan's safety is menaced. The point is that Japan can not allow China to barter away her birthright even if she is simple enough to engage in such folly. If China wants to test Japan's sincerity let her refuse all further concessions to occidental nations and secure for all time the inalienation of her territory, and Japan's task in regard to China will be finished. It is a question, however, whether China is yet able to do without the assistance of Japan in keeping foreign nations at bay; and this help, strange to say, is what China does

not want. Is it that China would rather be a slave of the white races than the equal of Japan? There is no need for China to be anxious about the return of Kiaochow. Japan has promised to restore the territory to China just as soon as China is able to guarantee that it will not again fall into the hands of a third party.

The inability of the Japanese to appreciate the Chinese point of view makes them all the more ready to attribute the Chinese agitation to British and American instigation. Various exaggerated and entirely unfounded reports of the sinister activity of British and American agents in inflaming students and others to organize boycotts and commit acts of violence against the Japanese press. Unfortunately, the anti-Japanese feeling prevailing among the majority of foreign residents in China, which frequently finds expression in the foreign-language press of that country, lends color to these reports. The resolution passed by the Anglo-American Association at a meeting when both the British and American ministers were said to be present and the resolution of the American Chamber of Commerce at Shanghai denouncing the Shantung settlement, have added to the resentment in Japan against the attitude of the British and American residents in China. The Kokumin in its issue of the 19th reports that the barracks of the American troops, as well as Red Cross and Y. M. C. A. rooms are being used as meeting places by Chinese and Americans engaged in anti-Japanese propaganda, and that the American legation has distributed sums amounting to 5,000,000 yen for financing such movements.

The Asahi's views as to the origin of the disturbances are saner than those of the majority of the press. It ascribes them to the prevailing belief among Chinese that Japan is behind the reactionary military clique, thus standing as an effectual bar to political progress, and to a desire among a section of the merchant class to check Japan's economic encroachment. The journal, however, also admits that it is quite conceivable that the direct and indirect assistance given by foreigners has had the effect of swelling the anti-Japanese agitation to its present dimensions, and alludes to the opinion prevailing among certain Japanese business men that Americans are taking advantage of this movement to extend their markets.

At first there was a tendency in Japan to minimize the seriousness of the situation in China, which was largely due to the optimistic note of official reports. The general attitude was that as Japanese goods were indispensable and the passions of the Chinese short-lived the boycott would soon be over. Later on, however, as the disturbances increased in intensity, the attitude changed to one of alarm. Moreover, it furnished anti-Government elements with a capital weapon for attacking the ministry's Chinese policy, and accordingly they lost no opportunity to paint in lurid colors the tribulations of Japanese residents.

The Jiji, which is better informed on China than most vernacular papers, not only believes that there are no immediate prospects of the disturbances being quelled but anticipates a further aggravation of the situation, which may spread to all sections of the country, in view of the conflicting political ambitions which lie at the root of the movement. It also hints that there are Bolshevik influences at work fomenting the spirit of revolution and anarchy.

As to measures for meeting the situation the Japanese press has various suggestions to offer. As is to be expected, the chauvinistic and anti-Government elements call upon the Government to take energetic measures to protect Japanese interests. The Kokumin says:

> Japanese goods have been burned; Japanese in China have been insulted and outraged, and the leaders of the pro-Japanese Chinese have been executed. Japan's honor has thus been set at naught by all possible means. If no steps are to be taken to remedy the situation, what about the prestige of this country?

The Hochi demands, if the Chinese Government is powerless to deal with the situation, that Japan should land troops herself. Also that it should take appropriate measures against British and American officials in China, should they prove to have participated in the resolution of the Anglo-American Association. A correspondent of the Yamato, who suffers from chronic anti-Americanism, has been so impressed with America's responsibility for the demonstrations, that he has become convinced that the solution of the troubles lies in an appeal to arms against the United States.

The Nichi Nichi believes that the arms loan should be revived, in order that the Peking Government may be supplied with arms and money to combat Bolshevism, which it alleges is now undermining the country, thanks to the efforts of Russian emissaries. It observes that it is only natural that the powers who have dispatched troops to Siberia and Russia to contend against Bolshevism, should render the necessary assistance to China in freeing her from this evil, and that Japan should take the lead because of her special position.

In view of the general tendency to attribute the causes for the troubles to conflicting ambitions of Chinese politicians, Anglo-American instigation, Bolshevik propaganda and in fact everything except Japanese aggressiveness, and to seek remedies accordingly, the views of the Chuo Koron (Central Review) are like a voice crying in the wilderness:

> The short cut to quieting the anti-Japanese agitation in China would be for the Japanese to restrain the Chinese policy of the bureaucrats and capitalists, so that the genuine peaceful requirements of the Japanese nation may be laid frankly before our neighbors. It should not be attempted to

suppress the dissatisfaction of the Chinese people by rendering assistance to Tsao, Chang, and other so-called pro-Japanese.

For many years we have been striving for emancipation of Japan from the grip of bureaucrats and militarists. In this respect the object for which the Chinese students are struggling must be described as the same as our own object. In this sense it must be said that the success of the Chinese agitation would mean the success of our own efforts for the emancipation of Japan from the baneful influence of the bureaucrats and militarists. If this be done, it will be possible to found the real national friendship between Japan and China on a sound and secure basis. It will be observed that all attempts at the promotion of Sino-Japanese friendship tried in the past have proved more harmful than beneficial.

THE KIRIN FORESTRY LOAN, CHINA.

Source: Reliable.

27 September 1919.

The importance and significance of the Kirin forestry loan can scarcely be realized by anyone who is unfamiliar with the extent of the valuable forest land involved. The Chinese interested in the development of China's latent resources have realized for many years the wonderful possibilities of the timber-land in the Kirin Province, and various efforts have been made from time to time to organize a company under official auspices to utilize the forests in that region. In December of 1913 Minister Chang Chien, of Agriculture and Commerce, called together the secretaries and councilors of his ministry at Peking to discuss the advisability of establishing a bureau of forestry and mining to operate in the three Provinces. The proposal was submitted to the cabinet, but very little resulted, as is so often the case in China, where industrial projects are presented.

The value and extent of the forest lands of Manchuria are indicated by the comments which appeared at the time.

From the Peking Gazette of 8th December 1913.

The three eastern Provinces have been well known for their dense forests, which have attracted the attention of foreigners, who have been constantly requesting the right to work them.

From the Peking Daily News of 14 January, 1919.

The forestry and gold mines in the three eastern Provinces are the crown of the whole country, figuratively speaking, and if the Chinese Government does not devise plans to protect them, their natural wealth offers a great temptation to foreigners. On this account Minister Chang has determined for the good of China to establish such a forestry and mining bureau.

The Chinese had good reason to fear the encroachments of certain foreigners interested in the forests. Reference to the manner in which both the Russians and Japanese took advantage of the agree-

ments concerning the forests of Manchuria was made in the Peking Gazette, of 8 November, 1913, as follows:

Some time ago in the conclusion of treaties with the Russian and Japanese it was stipulated that these forests should be developed conjointly with the Russians and Japanese but, as statements in the treaties have been so vague, we have found from time to time these privileges have been violated by these two powers Therefore it is absolutely necessary that means should be devised to protect our interests, and the following proposals are made: (1) The forests of the three eastern Provinces should be owned by the State. (2) Those which have been dominated by foreigners should be demanded by all means. (3) A thorough investigation should be made to find out the true condition of the forests of the three eastern Provinces and reforms should be introduced immediately.

The Japanese, knowing that the management and control of the Yalu Timber Co. has gradually drifted into their hands and that the power of the Chinese has been gradually weakened, are anxious to avail themselves of the precedents which have thereby been established and to use them in developing the forests in Kirin. In the new agreement, according to the Japanese version, it is stipulated that "Matters concerning the Sino-Japanese joint management shall be agreed upon between the representatives of the two countries on the lines of the precedents of the Yalu Timber Co. and the Taiko Gomei Kaisha (holding the concession to operate the Tienpoashan mines)." Thus, while the Japanese will represent publicly that the management will be a joint affair, they have made the above stipulation in such a way that the enterprise will be dominated by them, and so that they will reap the largest benefit.

The terms of the loan agreement, according to the Manchuria Daily News of yesterday, are as follows:

Kirin-Heilungskiang forestry and mining loan.

The Kirin forestry loan signed between Mr. Tsac Jlin (secretary of finance) and the Sino-Japanese Exchange Bank on the 4th ought to have been referred to as the Kirin-Heilungkiang forestry loan acounting to S. ¥. 30,000,000 (and not S. ¥. 20,000,000 as previously reported). The terms of the loan are said to be as follows:

Interest rate, 7 per cent; term, 5 years; security, forests and mineral products of both Kirin and Heilungkiang Provinces; no commission; Peking Government is to organize a company to work the forests and mines in the two Provinces.

It is also stated that the text of the loan agreement is appended with the following supplemental conditions: (1) When China brings into being in either Kirin or Heilungkiang Province a corporation for the exploitation of the forests and mines, the banks concerned in the loan shall furnish half the capital of the new corporation. (2) Matters concerning Sino-Japanese joint management shall be agreed upon between the representatives of the two countries on the lines of the precedents of the Yalu Timber Co. and the Taiko Gomei Kaisha (holding the concession to operate the Tienpaoshan mines). (3) In case of the Peking Government floating a debenture for the new corporation, the Japanese banks concerned shall underwrite part or the whole of such debenture.

As stated above, the amount of timberland involved is stupendous. It is estimated that about one-sixth of the whole Province of Kirin is covered with forests. One prefecture alone is said to produce yearly 2,500,000 pieces of timber, and it is said that this rate of production can go on for at least 100 years, and that in the same length of time the Province as a whole is capable of producing at

the yearly rate of 10,000,000 pieces. While few of the trees exceed 50 feet in height, they are practically innumerable.

The following observations regarding the forests of Kirin were made by a Britisher after he had completed an extensive survey of the district. The prefectures mentioned cover the greater part of the Province. The amounts were originally given in terms of the Japanese tsubo, which were converted into acres. The tusbo were given in round numbers and evidently indicated only the approximate amounts. This explanation is given to account for the apparently exact number of acres.

Kirin Prefecture.—There is plenty of wooded land, but the prefecture has only meager timbering assets.

Changehun Prefecture.—It contains three extensive forests, but only one of them is available for lumbering purposes.

Mengkiang Prefecture.—Seven forests, covering altogether about 220 square miles, are available.

Changling Prefecture.—Over 30 woods are scattered here and there, comprising about 90 square miles in all.

Huatien Prefecture.—Four thousand four hundred and sixty-two acres of woodland, of which two-eighths may be timbered.

Shulan Prefecture.—Twenty and odd woods, having an area of 74,380 acres.

Pinkiang Prefecture.—Seventy-five woods, covering 115,702 acres.

Wuchang Prefecture.—Eleven woods, covering 3,505 acres.

Yushu Prefecture.—Over 40 woods, covering 8,264 acres.

Changshou Prefecture.—It has six woods, none of which are good for timbering.

Acheng Prefecture.—About 20 woods, totaling about 3,305 acres in area.

Ning-an Prefecture.—Eleven woods, all unsuited for timbering.

Tunhua Prefecture.—Eleven thousand five hundred and seventy acres, of which one-tenth is available.

Omuse.—It contains an extensive forest, 100 miles from east to west and 167 miles from north to south.

Ilan Prefecture.—Twelve thousand three hundred and ninety-six acres of wooded land are good for timbering.

Linkiang Prefecture.—Three forests, covering altogether 55 square miles.

Mishan Prefecture.—Seventy-two woods, covering 77 square miles.

Fangcheng Prefecture.—Thirty woods, covering 21,487 acres.

Huachuan Prefecture.—Three forests, covering 55 square miles.

Fuchin Prefecture.—Two forests, one of which is being worked.

As the Japanese will be able to obtain their timber for next to nothing and in almost unlimited quantities they will probably be

able not only to dominate the lumber trade of the Far East, but to have a cheap supply for their own needs. The extensive projects which they have for railway development in Manchuria and Mongolia will be more easily and cheaply realized with the forest products to which they will now have easy access. This will be particularly true of the Kirin-Kwainei Railway for which a loan of gold yen 20,000,000 was signed on the 11th ultimo. This road will penetrate some of the forests which are security for the new loan and which the Japanese are to work "conjointly" with the Chinese. At Kwainei, which is on the Korean frontier, the line will connect with another railway, and the timber from the Kirin Province can readily be moved to some ice-free port for exportation to Tientsin, where there is a large and constant demand for lumber, and to other far eastern or to even western countries, as soon as the freight rates are reduced. While there is a large supply of timber in the Yalu Valley it is most difficult to move at any time, and in winter it can not be moved on the river at all on account of ice which is often more than 3 feet thick. There will, however, be nothing to hinder the movement of timber by rail from the Kirin forests at any time of the year and the exportation can be practically continuous.

As the Japanese are getting under their control the principal Chinese sources of wood, coal, and iron they will in time be able to build ships and manufacture articles of all kinds at a lower cost than any other people in the world. They will have the advantage of the cheapest labor, and their manufactured articles will be at the actual point of consumption of one of the largest and most important markets. Competition in any lines which they may produce will be well nigh impossible.

The people of Kirin realize how disastrous to their interests the forestry loan will become and they are up in arms about it. Indignation meetings have been held and the Government at Peking as well as the Japanese have been severely criticized. A boycott against Japanese goods has been started, but it is doubtful if it will last any length of time.

CHINESE BOYCOTT ON JAPANESE GOODS AT NANKING.

Source: Reliable.

19 September 1919.

The appended comparative table shows the effects of the Chinese boycott for the months of June and July, 1918, against June and July, 1919, on the import of goods of Japanese origin into Nanking.

Nanking customs.

Comparative table of principal articles of Japanese origin imported during June and July, 1918 and 1919.

Description of goods.	Quantity.	1918		1919	
		June.	July.	June.	July.
Shirtings, grey, plain	Pieces	11,400	13,550	320	.....
Shirtings, white, plain	do	310	300	.....	.....
Sheetings, grey	do	380	160	.....	.....
Drills	do	660	1,610	.....	.....
Jeans	do	600	4,020	.....	.....
T-cloths	do	4,960	6,810	1,000	.....
Turkey red cotton and dyed T-cloths	do	180	360	.....	.....
Flannellettes, plain, dyed, or printed	do	82	79	.....	.....
Cotton yarn	Piculs	1,031	443	.....	.....
Copper ingots and slabs	do	.....	.....	.....	.....
Coal	Tons	.....	1	.....	.....
Match-making materials, labels	Piculs	42	63	12	6
Phosphorus	do	.....	15	.....	.....
Potash, chlorate of	do	42	42	.....	.....
Wood shavings	do	465	195	.....	.....
Wood splints	do	974	532	1,252	.....
Unclassed	Value	.....	210	60	.....
Porcelain ware	do	916	912	530	.....
Soap, toilet and fancy	do	534	2,027	444	.....
Tooth powder and paste	do	504	299	.....	.....
Umbrellas	Pieces	48	.....	.....	.....

TURRET ACCIDENT ON BOARD JAPANESE BATTLESHIP "HYUGA" DURING MANEUVERS.

Source: Reliable.

7 November 1919.

On 24 October at 1.30 p. m., during the naval maneuvers (11 to 26 October, 1919), and while the Red and Green Fleets were simulating an engagement, an accident occurred in No. 3 turret of the battleship *Hyuga*.

Blank charges of black powder were being fired from the 14-inch guns to exercise range-finder groups and fire-control groups and navigational personnel in overcoming smoke difficulties.

A strong wind blowing toward the guns was probably the cause of five or six extra charges in the upper turret being set on fire.

All people in the upper turret were burned to death—1 lieutenant, 1 gunner, and 11 men.

As there were no survivors, it is impossible to get much information as to what actually happened.

The explosion blew off and overboard the roof of the turret, and the fragments wounded some 15 men in the vicinity of the turret.

There was no further injury to the ship beyond damage done by the intense heat to the gun fittings in the turret.

The lower chambers were effectively sealed against the flame from the upper turret chamber.

The *Hyuga* proceeded to Yokosuka and landed the dead and wounded, rejoining the fleet off Yokohama for the naval review.

The *Hyuga* is a 30,600-ton superdreadnaught, carrying twelve 14-inch guns in six turrets and sixteen 6-inch guns.

She was built at the Mitsubishi shipyard, at Nagasaki, being launched on 27 January, 1917.

NEW DESTROYERS FOR JAPANESE NAVY.

Source: Reliable.

7 November 1919.

The small type vessels of the Navy which are now in the course of construction are seven first-class destroyers and eight second-class destroyers.

The first-class destroyers *Minekaze* (Maizuru Arsenal), *Sawakaze* (Mitsubishi Dockyard), and the second-class destroyers *Momi* (Yokosuka Arsenal), *Kaya* (Yokosuka Arsenal), *Nashi* (Kawasaki *Dockyard*), *Take* (Kawasaki Dockyard), are now equipping.

The first-class destroyers *Okikaze* (Maizuru Arsenal, to be launched in October), the *Shimakaze* (at Maizuru Arsenal), *Yakaze* (at Misubishi Dockyard), the *Hakaze* (at Mitsubishi Dockyard), and the second-class destroyers *Nire* (at Kure Arsenal), the *Kuri* (at Kure Arsenal), the *Kaki* (at Uraga Dockyard), the *Toga* (at Ishikawajima Dockyard), are now in the course of construction. These destroyers are all delayed about six months.

The *Minekaze*, *Sawakaze*, *Momi*, *Kaya*, *Nashi*, and *Take* will complete their equipment during this year and will enter into services at their own naval port where they are building.

LAUNCHING OF NEW JAPANESE DESTROYER.

Source: Reliable.

7 November 1919.

The *Kaki*, 850-ton second-class destroyer, which has been building at the Uraga Dockyard, Yokohama, has been launched, 20 October, at 2.30 p. m. She will make 33 knots.

Fleet Admiral Count Togo and many other naval officers of high rank were present.

After completion the *Kaki* will be attached to the Yokosuka Naval Station.

COAL PRODUCTION IN JAPAN.

Source: Reliable.

7 November 1919.

The production of coal in Japan is increasing at a fair rate, but the rate of increase is far smaller than that of consumption.

According to the mining bureau, the yield of coal up to August was 17,022,417 tons. This figure is an increase of only 6.1 per cent on the same period of last year.

Japan's consumption of coal, on the other hand, has increased with greater speed than production. This summer the season was not so dull as usual, owing to the great expansion of industries under the stimulating influences of war prosperity.

Lump coal was exported to the extent of 957,000 tons against 1,300,000 tons for the same time last year—and 1,500,000 tons for the same period in 1917.

Small coal was exported to the extent of 200,000 tons against 215,000 tons for the last year period and 320,000 tons for 1917.

JAPANESE BATTLESHIP "NAGATO."

Source: Reliable.

7 November 1919.

The following are the main particulars of the battleship *Nagato*, which is expected to be launched at Kure Naval Station:

Length, 660 feet.
Width, 65 feet.
Draft, 30 feet.
Tonnage, 33,800 feet.
Speed, 23 knots.
Crew, 1,436 officers and men.
Armament:
- Eight 16-inch guns.
- Ten 6-inch guns.
- Two antiaircraft guns.
- Two underwater torpedo tubes.

The *Nagato* is also equipped with the latest submarine listening device.

FORMOSAN COAL FOR JAPAN.

Source: Reliable.

7 November 1919.

This spring the Mitsui Bussan Co., planning to transport coal from Formosa to Japan, tried an experiment with about 50,000 tons of Formosan coal for the Tokyo Gas Co. At that time, because of high freight rates from Formosa to Japan, the transportation was stopped for a time. But now, as a supplement to the Japanese coal, it has been decided that from now on Formosan coal will be transported regularly to Japan. As to the methods of transportation, the railway between Sammoto and Kirin is being reconstructed and cargo boats on that trip will be increased. Thus 30,000 or 40,000 tons are expected to be transported to Japan during this year, and during the next year it is said that over 700,000 tons will be transported. The coal production in Formosa for 1920 is estimated at about 800,000 tons.

LUXEMBURG. POLITICAL AND SOCIAL.

Source: Reliable.

1 November 1919.

It is believed that in spite of the result of the recent referendum in the Grand Duchy, the people are more sympathetically disposed toward Belgium than toward France, and that with the more friendly policy, adopted by Belgium toward Luxemburg, the two countries can come to an understanding which will prove of advantage to both; consequently, negotiations may be expected with a view to establishing an economic alliance also between Belgium and Luxemburg.

The result of the recent elections on 28 October in the Grand Duchy gave substantially 37 supporters to the monarchy out of a total of 48. The party of the Right (Catholic) received 27 votes; Socialists, 9; Liberals, 7; Independent Clericals, 3; and the Free Peoples' Party, 2. The Socialist leader, La Croix, and the burgomaster of Luxemburg were defeated. The first returns in the elections for the new Chamber of Deputies is interesting, as it shows that the women's vote on the first application has given a Catholic majority. Under the old franchise the house numbered 53. Taken in conjunction with the plebescite vote, which carried out the principle of self-determination for Luxemburg, this election indorses the monarchical principle as the choice of the population.

MISCELLANEOUS.

ORIGIN OF THE TERM BOLSHEVIKI.

Source: Reliable.

30 April 1919.

Early in the nineteenth century society in western Europe began to face an insistent and widespread demand for reform. This demand was an outgrowth of the industrial revolution and the doctrine of laissez-faire. Progress in reform differed in various countries somewhat according to their constitutional development. In Great Britain new accommodations were arrived at more easily than in France. During the twenties, thirties, and forties, agitations in Great Britain brought forth the reform bill of 1832, the corn-law repeal in 1846, free trade, educational reform, and social reform. In France the Revolution of 1789 was followed by another revolution in 1830. Then a King, Louis Philippe, widely heralded as a Liberal, gave way to a rule by the wealthy under the policy of the "golden mean." According to Prof. Hazen the legislation enacted was class legislation which favored the wealthy, or the bourgeoisie, and no attempt was made to meet the demands of the masses. Of the masses, Prof. Hazen writes, in his Modern European History (in the American Historical Series, of which Prof. Charles H. Haskins, of Harvard University, is general editor), as follows:

> Their situation provoked discussion and many writers began to preach new doctrines concerning the organization of industry and the crucial question of the relations of capital and labor, doctrines henceforth called socialistic, and appealing with increasing force to the millions of laborers who believed that society weighed with unjustifiable severity upon them, that their labor did not by any means receive its proportionate reward * * *.

Prof. Hazen repeats the questions which might have occurred to many. Would people with such feelings and beliefs be disposed to take revenge on their former oppressors when once they found themselves masters? Or would they devote themselves to reconstructions?

A revolution in France occurred again in 1848. It had been planned as a social revolution rather than a political one. The State was to become an industrial Republic with "national workshops," which should be managed by the workers themselves in each particular industry. The product of their labor was to be divided among them "*from each according to his capacity and to each according to his services.*" But the new revolution was not according to plan; that is, it was not wholly socialistic. Idealist Republicans, at the

head of whom stood Lamartine, had been stirred to political action by monarchist repression. They came from the liberal middle class or bourgeoisie. While the socialistic revolt was taking place, these Republicans were able to capture the Government. Fearing the Paris working men, they catered to the Socialists by appointing Louis Blanc, the Socialist leader, to head a labor commission, and ordered the creation of the "*national workshops*." Then, as soon as it was safe and convenient, the Socialists were ignored, Louis Blanc failed to keep place in the Government councils, and the "*national workshops*" were ordered abolished. The workers were enraged. They attempted a violent revolution and fought under the red flag, the emblem of socialism, but they were unsuccessful; and the middle class, now thoroughly alarmed, took a terrible revenge. The uprising was ruthlessly suppressed, June 23–26, 1848, but socialism survived with more positiveness and hardiness than before. "The June days left among the poor an enduring legacy of hatred toward the bourgeoisie."

Upon turning to the history of Great Britain, one finds that the growth of socialism in that country has been very slow. The first Socialist Party, organized by Hyndman and Morris in 1880—the lateness of the date is significant—was a downright failure. The British workingmen continued to look to the Liberal Party for political reform and to their own labor unions, which had been recognized by statesmen and capitalists, for economic betterment. The famous Fabian Society (organized in 1883), the tactics of which is signified by its name, carried on a ceaseless agitation from the pens of such writers as George Bernard Shaw, H. G. Wells, Sidney Olliver, and Sidney and Beatrice Webb, and these Fabians succeeded in converting the Liberal Party from its historic policy of laissez-faire to State socialism. (Schapiro, Modern and Contemporary European History, p. 593. In 1906 a distinct Labor Party was formed, which, in 1914, declared for the collective ownership of land; but its tactics were unchanged, and the party continued its support of the Liberals. Since 1914 the Liberals have passed out of power and have for the moment disappeared as a political party. In the new Parliament, which has recently begun its sessions in London, the new Labor Party constitutes the Government's constitutional opposition.

During the thirties and forties a number of Germans, who for various reasons found France more hospitable to them than Germany, were attracted to Paris, where they studied socialist doctrines and the socialist movement. A communist league was organized by German workmen in Paris. Among these emigrant Germans was Karl Marx. About 1844 he was obliged to leave France, and he took up his residence in London. In that city he attended in 1848 a congress of the

communist league, for which he and his friend Engels drew up the famous Kommunistische Manifest, which was published on the eve of the French Revolution of 1848. Marx and some of his German associates later became leaders of the socialist movement in Germany. The story of this movement is not of particular importance in relation to the movement in Russia before 1903, but the fact that Marx wrote his classic work on Das Kapital is of importance, for in Russia, as in many other countries, Marx's work became a sort of text-book for the socialists.

To what degree and in what manner the reform movement in Russia was influenced by what was going on in western Europe are matters which have not been determined. The liberal ideas of western Europe had been by no means unknown in Russia. Beginning with Alexis (1645–1676) the trend of the policy of the sovereigns was to rescue Russia from her state of semi-Asiatic isolation, and to establish her in an important position in the great European family. Peter the Great (1689–1725) and Catherine II (1762–1796) were distinctly progressive. Alexander I (1801–1825) was a liberal force in Europe, and his liberal tendencies no doubt greatly stimulated a liberal movement in Russian intellectual circles. But with the Russian Czars periods of liberalism and enlightenment were often followed by dark, repressive absolutism, and Alexander I was no exception. By playing upon his fears, Metternich effectually swayed Alexander from his liberalism and caused him to be the moving figure in the Holy Alliance. During the latter part of his reign and during the whole of the reign of Nicholas I (1825–1855), many Russian liberals suffered exile in Siberia or were forced to reside abroad. Under Nicholas I punishment for liberals of every kind was of great severity; and religious persecution was added to political. The severity of repression in Russia, and the unreasonableness of it, naturally caused very strong reactions in the minds of some who suffered by it. Notwithstanding the policy of reform followed for some years by Alexander II (1855–1881), the most deeply offended and most convinced of the conscientious Russian liberals remained unreconciled.

At Zurich, Switzerland, in the early seventies there resided about 300 Russian students of reform. Most of them were favorable to federalism, which fundamentally is the basis of anarchism, but they were by no means agreed upon any one form of federalism or policy. There were two sharply divided schools. One was the school of Bakunin, which believed in employing the "riot" as a means of educating the people; and the other was the school of Labrov, which believed in the policy of permeation—the gradual spreading of revolutionary ideas among the people. It was Bakunin, the Russian anarchist, who interfered in the international gatherings of western

Europe, 1867 and 1871 (?), and successfully combated Marx. So far as a progress of reform for Russia was concerned, Bakunin's actionist anarchism triumphed over the social democracy of the West. To the Russian reformer's mind of that period social democracy working through constitutional channels was impracticable where czarism had to be combated and where the western program would not go far enough.

It is said that at Zurich questions of principle and method were "hotly and loudly discussed" on the streets, in restaurants, and in private rooms. It was characteristic of the Russians that they "hotly and loudly discussed" in Zurich at all hours of the day and night their questions of principles and methods. They argued till one idea prevailed. Tactics suitable for work in Russia must be evolved—western tactics were impracticable. "The working class must work out its own political and social salvation." This became axiomatic. But these Russians at Zurich were not themselves of the working class; they were of the *intelligentsia;* they were out of position. The conclusion was not to be escaped: they must themselves become members of the Russian working class. It was this intense conviction, combined with a most wonderful missionary zeal, which was imparted in Russia to many of the young *intelligentsia*, and visible opportunities for work which impelled many of the educated youth to go among the people and to be of the people. This was the famous movement which got under way during the winter and spring of 1873–74.

This movement was destined to fail as a movement of any immediate consequence. The refined young *intelligentsii* did not succeed very well in making themselves at home with the workmen and peasants. The gulf they were trying to bridge was very wide. There was hardly yet any conscious political, intellectual activity sufficiently fertile for effective propaganda among the workingmen. It soon became apparent that the simple peasants were waiting for some miracle, and that the idea of their doing something to bring about the miracle could not be brought to their comprehension. The Czar was to give his people the land, some day, without compensation. Meanwhile, the government of Alexander II abandoned its policy of benevolent form, became alarmed at the energetic but floundering reformers, and resorted to wholesale arrests and persecution, which put a stop to the movement. What were the gains? The field of labor had been tested, and the difficulties it presented became matters of first-hand experience to be keenly analyzed by those who would persevere; the persecution by the Government was of such a character as to awaken the sympathy of the *intelligentsia* class as a whole and to lead this class to study political and social problems.

The ruthless methods of the Government used in suppressing this movement (1874–75) caused a split in the ranks of the Russian liberals. Some were discouraged and deserted the movement for a time, at least, and thus furnished material for the formation of a new conservative reform party in the future. Others were angered and nettled and became even more radical and daring—revolutionaries. The view of these latter was, "The Government has declared war on us. Our direct policy must be to overthrow it." But what was then to be done after the Government was overthrown? It was urged that a constituent assembly be called immediately after the fall of the Monarchy, but that nine-tenths of its membership should represent the peasantry in order to guarantee a "complete revolution of all economical and State relations."

In 1879 the reformers set forth a program as follows: (1) A gradual popular representation with full powers over all affairs of state: (2) a large measure of autonomy (local) to be secured by the independence of the *mir* and the economic independence of the people; (3) "the land must belong to the people"; (4) the transference to the workmen of all mills and factories; (5) complete freedom of conscience, speech, press, meetings, associations, and election; (6) universal suffrage without property or class limitation; (7) the replacement of the standing army by territorial militia.

The means to be employed, the tactics, were of an activist character. A steady propaganda was to be carried on directly and by the expression in the form of popular meetings, demonstrations, petitions, and addresses. Certain passive tactics were also to be employed as, for example, the refusal to pay taxes. Violence, however, was a definite part of the program, Bakunin's theory of the "riot" and destructive and terroristic activity as a means of educating the people was to be applied. Destruction and terrorism were also designed to exercise a decided influence upon the Government. Mixed with these "war policies" was the curious design of securing influential positions in the enemy's camp. The party machinery was to be highly centralized and secret. Secret societies specially organized were to be bound about one center; and the party was in all cases to take the initiative in advance of the people. Such were the tactics based upon the evident conclusions that there was no hope for the reformation of the monarchy and that no compromise or tolerance was to be expected from it; that there was no spontaneous mass movement to be expected in the near future; and that the problem of educating the people by example was first and foremost.

Violent means had already been resorted to, for individuals had initiated political assassinations in 1878 and 1879 before the adoption of the party platform. Under the name or slogan "Narodnaia Volia," the group began its campaign of organized terror under the

direction of an elected terrorist committee. A train, on which the Czar was thought to be traveling, was blown up near Moscow; Khalturin, an "advanced workman," dynamited the floor of the dining hall of the palace at the dinner hour, but missed the Czar; on March 1, 1881, the Czar was actually murdered by bombs thrown on the street. The Government was thoroughly aroused, and the police finally succeeded in developing traitors in the ranks of the revolutionary-nihilist party. Those members who were caught were executed, the last of them on 8 May, 1887; the others fled the country.

Switzerland, as in former years, proved to be the chief refuge for Russian political and social reformers. By 1883, Plekhanov, Akselrod, Deitch, Ignatov, and Vera Zasulich were there. The group seems at first to have devoted itself to the examination of the question why their movement had failed of its purpose. Relatively educated as the propagandists were, they felt a need for more knowledge of the laws of human progress. This was their confession. Accordingly, they began to study the socialist movement as it had been developing in Western Europe. Several conclusions were arrived at. That a few revolutionists, even if they could obtain possession of the Government, would be quite powerless to liberate the people in any real sense; that the people alone could liberate themselves, and could only do that by consciously discarding the old order. The works of Marx, Engels, Kautsky, Liebknecht (father of the late Carl Liebknecht), Bebel, Lafarge, and Guesde were mastered. A number of years were thus spent in study. The group finally became converted to western European social democracy and formed the first definite social democratic organization in the Russian movement. The organization was called "Ocovobojdenie Truda," Emancipation of Labor.

In 1891 a famine spread itself over Russia and furnished a favorable opportunity, a psychological moment, for the carrying on of socialist propaganda. The agitation was begun without any definite political aim other than the general education of the masses. It had a certain permanent effect upon the minds of radically minded youth. With the return of good industrial conditions the agitation subsided. But the gains were followed up. Working men of their own accord began the organization of labor unions and formed study groups, which were taught by Social Democrats. The works of Marx were used as texts. The Government saw nothing objectionable in the Government ownership theories of Marx, and the sale of his books in the open marked was "legal." Suspected working men, however, did well to keep such books under cover. The labor-union movement was spontaneous, and was led by "advanced" working men, who had acquired some knowledge of Marxist ideas. Thus in the early nineties the two streams of the Russian reform move-

ment, the working men and the *intelligentsia*, were beginning to meet, and the whole movement was strongly impregnated with Marxism. Until this time the Russian movement had been violently revolutionary, anarchistic, and independent of the social democratic movement in western Europe. But it must not be supposed that anarchists and revolutionaries had all become Social Democrats or that future Russians radically minded would be satisfied with mere social democracy. A few years served to demonstrate that they were not.

The development of modern industry and capitalism in Russia during the nineties under the protection of Count Witte played right into the hands of the Marxist, Social-Democrat propagandists, was in complete accordance with the Marxist hypothesis. It was to the advantage of the propagandists, too, that the pressure upon the Russian Government was being exerted by foreigners. The Russian landed aristocracy was regarded as politically powerless; and the liberal Russian zemstvo's were enmeshed in the capitalistic stream of influence, because the membership consisted largely of industrial and commercial men. According to the Russian Social Democrat, the only real antagonist of bureaucracy and capitalism was the proletariat, the usual connotation of which at this time was the working class rather than the peasantry.

During the year 1895 there was a noticable increase in the number of labor-union strikes. In 1896 there were many more strikes, and in 1897 the number of strikes and their extent was very considerable. It became evident for the first time that the formation of labor unions was being followed by a genuine mass movement, a result of conditions, and the time seemed ripe for the formation of a national party organization. So the leading Social Democrats called a congress which met at Minsk in March, 1898, and organized the Russian Social Democratic Working Men's Party.

The Minsk congress of Russian social democrats, in March, 1898, met in strict secrecy. Even the working men of the "periphery" knew nothing about it. It was made up chiefly of representatives of "Unions for Struggle," which had been organized in St. Petersburg, Kiev, Moscow, and Ekaterinoslav. The identity or relationship of these "Unions for Struggle" with the labor unions which had been organized by working men is not clear. The "Unions for Struggle" may have been organized by the *intelligentsia* rather than by working men. However, there soon became apparent in the congress three distinct tendencies of thought. There were some adherents of the "Emancipation of Labor" group, which had originated in Switzerland and which now presented a program or party platform written by Plekhanov. It will be recalled that Plekhanov was one of the leading Russian liberals in Switzerland in 1883. He has

since been called the Father of Russian Social Democracy. He died in Petrograd last year heartbroken, it is said, because of the excesses of the Bolsheviks. The "Emancipation of Labor" group consisted almost entirely of *intelligentsii.* A second group or tendency of thought represented the working men's own stream of thought, the fundamental of which was practical improvement—"the immediate improvement of the condition of every workingman." This was called "Economism." Economism pronounced itself in favor of activity for immediate betterment of material conditions rather than activity for political reform. Political reform was yet too theoretical or impracticable to the minds of the Russian workingmen. A third group embraced the more radical element of the *intelligentsia* reformers—the radically minded element. They were the theorists and the doctrinaires, and were for the present concerned primarily with getting the party properly organized—in devising the machinery through which they could later impose their doctrines and theories. Naturally, they wanted a very limited centralization involving the maintenance of a secret, conspirative "general staff," the structure of which was to be gradually enlarged so as to bring it into the desired amount of contact with the locally organized groups, the component parts of the "army."

The principal exponent of the ideas of the last-mentioned group was Lenine (Vladimir Ilitch Ulianov), who in November, 1917, became the Bolshevist premier of Russia. According to him, the masses were to be organized by the party machine and "disciplined by continuous agitation." Strikes were to be steadily "developed." The organized mass was to be called into participation in "propaganda circles" and was to have the administration of its own strike funds. Although Bakunin's tactics had once failed miserably, the Minsk congress allowed itself to fall under the influence of the extreme radicals, and the Bakunin tactics as resurrected and revised by Lenine were adopted.

The political and socialist theories of the new Russian Social Democratic Working Men's Party, as set forth in a manifesto probably drawn up by P. B. Struvë, were substantially the views of the emancipationists of the Swiss school. A comparison was drawn between the French Revolution of 1848 and the future Russian revolution. From the customary Marxist point of view, this revolution marked the beginnings of the proletarian struggle in western Europe. It was apparently believed that in Russia a social revolution would be either contemporaneous with, or precedent to a political revolution; that is, the old political structure might be destroyed, then a social revolution worked out, and finally a new political order developed with premises on the new social order. There was no longer to be any question about limiting the aims of the party to

immediate economic needs. So as this party was concerned, the "Economists" were not to be the leaders. The party was to be managed by the *intelligenstii*. Lenine's doctrine was approved in the manifesto: "All the organizations must act according to one plan, and must obey orders." The manifesto contained no reference to the agrarian question. The party was therefore one of *intelligentsii* and working men with the *intelligentsii* in the saddle. The peasants were left out altogether, probably because they showed no immediate promise of revolutionary development.

The workingmen "Economists" were not yet ready to follow the *intelligentsii* leaders and "obey orders," as set forth in the plan devised by Lenine. A split occurred in the party within the year, and it occurred over the crucial issue of political activity versus immediate betterment, "economism." The larger group—the dispute was in the rank and file of the party, for the Congress had adjourned—was led by the editors of the newspaper called Working Men's Activities, who, because of their knowledge of both phases of the question and because of their practical experience, adopted an eclectic attitude toward economism and political activity alike and would compromise and work for both. The smaller faction was led by the less experienced, radically minded, theoretical *intelligentsia* group. They would accept no compromise, and in 1900 formed the "Revolutionists' Organization of Social Democrats," an organization still within the ranks of the "Russian Working Men's Social Democratic Party."

The recurrence of conditions of commercial and industrial crisis in the year of 1899 furnished immediate opportunity for resuming the spread of Socialist propaganda on a large scale. The spontaneous movement among the laboring classes, which had first made itself felt as a mass movement in 1896, spread widely, even to Krasnoyarsk on the Trans-Siberian Railway and to Tiflis in the Caucasus. The university students again become demonstrative and many took up active work in the Social-Democratic Party. It was suggested that popular squares be used to impress the Government and public opinion, and from 1900 these *demonstratsii* became a characteristic and very prominent feature in Russian social and political life. By February, 1900, the Government found itself unable to suppress this new form of agitation. During that year and the two succeeding years of 1901 and 1902, and also during 1903, the unrest continued on the increase. Propaganda activity was conducted with especial vigor in the south of Russia, where Ukrainian separatism was already strong. The huge demonstrations which were held were quite beyond the power of the Government to suppress or even in any considerable degree control.

By 1903 the numbers of members and the extent of the activities of the "Russian Working Men's Social Democratic Party" had so

increased that the differences between the "Revolutionists' Organization of Social Democrats" and the main body of the party came to be keenly felt, especially since these differences had to do chiefly with tactics and immediate aims at a time when the party had to make the most of an approaching strike movement of considerable proportions. The ultimate goal to be reached was the same for both factions of the party—the complete socialization of the nation, so far as Russia was concerned. True to their own conception of proper tactics the Social Democrats outside the revolutionists' organization had so far been able to confine the strike agitation within peaceful limits and thus prevent "that useless slaughter of workingmen which might so easily have occurred in these days, and which might have drowned in a sea of blood the proletarian movement at its very beginning." The "Revolutionists' Group of Social Democrats" derided what they regarded as the restricted aims of the "economist" school, and advocated the adoption of violent measures of defense against the attacks of the authorities. They thus took the position formerly maintained by the *Narodnaya Volya* in the early eighties which was thoroughly driven from Russia by the Government by 1887.

In view of the disagreements between the factions of the party, it was decided to hold another congress or convention and make some effort to adopt a policy to be pursued in unity with reference to future developments in the labor movement. This was to be the second convention of the Russian Working Men's Social Democratic Party. The first convention or congress had been held at Minsk in March, 1898. The second convention was held at London in the summer of 1903. The question of tactical program immediately arose, and Lenine, the uncompromising leader of the radically minded, the champion of centralized and dictatorial party administration, again won a majority for a radical tactical program to be executed by the *intelligentsii* or the revolutionists' group. The result was a hopeless split in the Social Democratic Party. The radicals, headed by Lenine, who had won a majority (bolshinstvo) in the convention, became known as the Bolsheviki, while those who had found themselves in the minority (menshinstvo) were called the Mensheviki, and the two factions of Russian social democracy so designated have continued in existence until the present day.

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